e-ISSN: 0976-822X, p-ISSN:2961-6042

Available online on http://www.ijcpr.com/

International Journal of Current Pharmaceutical Review and Research 2026; 18(6); 2486-2496

Original Research Article

A Prospective Observational Study to Assess Analgesic Effect of Ultrasound-Guided Transversus Abdominis Plane (TAP) Block and Trans-Muscular Quadratus Lumborum (QL) Block for Post-Operative Pain Relief in Inguinal Hernia Surgery

Brisha Modh[1], Mitali Ahir[2], Dhavalkumar C. Patel[3]

[1]Senior Resident, GMC, Surat, Gujarat, India
[2]Assistant Professor, GMC, Surat, Gujarat, India
[3]Assistant Professor, GMC, Surat, Gujarat, India

Received: 01-03-2026 / Revised: 15-04-2026 / Accepted: 21-05-2026
Corresponding author: Dr. Mitali Ahir
Conflict of interest: Nil

Abstract

Background and Aims: Inguinal hernia repair surgery is one of the commonly performed surgeries and causing significant postoperative pain. There are different ways to treat post-operative pain. Here, we aimed to compare Ultra sound guided QL block (Group Q) with TAP (Group T) block in these patients.

Methods: Sixty-six adult patients with American Society of Anaesthesiologists physical status I to III, undergoing open inguinal hernia repair under spinal anaesthesia were enrolled in study. Post operatively patients received USG guided either QL or TAP block with injection bupivacaine (0.5%) 15 ml, Inj dexamethasone (8 mg) 2 ml, Inj distilled water 15 ml (total 32 ml). We documented the quality of analgesia, change in hemodynamic parameters, time to administer rescue analgesia and any adverse event with these techniques within 24 hours postoperatively.

Results: Within 24 hours, higher proportion of patients in Group Q (60.60%) avoided rescue analgesia compared to Group T (51.51%), with fewer patients in Group Q needing one or two doses. The p-values for rescue analgesia administration were 0.03 for the first dose and 0.455 for the second dose. No significant differences were observed between Group T and Group Q in hemodynamic parameters in any measured time points and no side effect was observed.

Conclusion: The two block techniques demonstrated comparable results over 24 hours, both at rest and during movement. Hemodynamic parameters remained stable throughout study and showed no statistically significant differences between the groups.

Keywords: Inguinal Hernia; Regional Anaesthesia; Tran's Muscular Quadratus Lumborum; Transversus Abdominis Plane Block.

DOI: 10.25258/ijcpr.18.6.386

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0) and the Budapest Open Access Initiative (http://www.budapestopenaccessinitiative.org/read), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

Introduction

Inguinal hernia repair is a commonly performed surgical procedure often associated with moderate to severe postoperative pain. Effective pain management is crucial to improving patient outcomes, reducing complications, and facilitating early recovery.[1] Pain triggers physiological stress responses, increasing the risk of cardiovascular complications, respiratory issues, and poor wound healing. If not effectively managed, it can also contribute to anxiety, sleep disturbances, and opioid dependence [27].

Traditionally, postoperative pain has been managed with systemic analgesics, including opioids and nonsteroidal anti-inflammatory drugs (NSAIDs). Opioids, while effective, are associated with side effects such as nausea, vomiting, drowsiness, respiratory depression, constipation, and the potential for dependence. NSAIDs, though useful, may lead to gastrointestinal irritation, renal dysfunction, and increased bleeding risk [2].

Effective regional anaesthetic techniques for abdominal surgery include epidural analgesia, paravertebral block, transversus abdominis plane (TAP) block, and quadratus lumborum block (QLB) etc. [2] Ultrasound (US)-guided regional anaesthesia allows the operator to ascertain optimal needle positioning and avoid the uncertainty of blind techniques. [2] The TAP block, first

described by Rafi, provides analgesia by targeting the transversus abdominis plane, which contains the anterior rami of spinal nerves (T6-L1) [2]. Performed for analgesia in almost every type of abdominal surgeries such as caesarean sections, laparoscopic procedures, appendectomies, and inguinal hernia repairs.[3] This technique effectively blocks somatic pain from the lower abdominal wall, making it a reliable option for hernia surgery. However, its limitation lies in the inability to adequately cover visceral pain, which can still lead to discomfort in some patients.

In contrast, the QL block, introduced by Blanco, extends the analgesic effect beyond the abdominal wall by involving the thoracolumbar fascia. The local anaesthetic spreads more cranially, potentially reaching the paravertebral space and providing broader coverage, including visceral pain relief.[2] effective method of postoperative pain management for abdominal surgeries, such as gynaecological procedures, caesarean sections, appendectomies, and colorectal procedures [3].

This dissertation primarily aimed to evaluate the efficacy of ultrasound-guided transversus abdominis plane (TAP) block and quadratus lumborum block (QL) block in providing postoperative analgesia for patients undergoing inguinal hernia repair. To achieve this, the research involved a systematic review of existing literature and a comprehensive clinical study to compare the TAP block with QL block techniques.

The study specifically sought to determine whether the TAP block and QL block could significantly reduce postoperative pain levels and opioid consumption in this patient population. Additionally, it explored the potential advantages and limitations of this regional anaesthesia technique, providing valuable insights into its role in multimodal pain management.

The findings of this research contribute to the growing body of evidence that informs best practices in postoperative pain management, potentially leading to improved patient outcomes and enhanced recovery protocols at our tertiary care hospital.

Aims and Objective:

Goal: Aim of this study is to assess analgesic effect of transversus abdominis plane (TAP) block and Tran's muscular quadratus lumborum (QL) block.

Primary Objective: To document the quality of analgesia by pain scoring system after using these techniques. **Secondary Objectives**: To assess the change in hemodynamic parameters with these techniques, to know the time to administer rescue analgesia and document any adverse event with these techniques.

Material and Methods

After receiving institutional ethical committee approval on 14th September, 2023 and obtaining written informed consent from the patients, the study was initiated. Patients under American Society of Anaesthesiologists (ASA) physical status I-III, aged 18-70 years, who were undergoing elective unilateral open inguinal hernia repair under spinal anaesthesia without additives, were enrolled in the study. Patients with multiple hernia repairs, bilateral inguinal hernias, obstructed and strangulated hernias, or recurrent hernias were excluded from the study.

Study Design: A prospective observational study.

Sample Size Calculation: The sample size was calculated using the EPI Version 3, open- source calculator, based on a study by Okur et al. [3] The minimum required sample size with 80% power of the study and a 95% confidence interval is 45. Considering difficult anatomy/difficult USG visualization, loss to follow-up, withdrawal from study and duration of data collection in residency period, 33 patients were enrolled in each group in our study.

Inclusion Criteria: Patients aged 18-70 years with ASA Class I-III, undergoing unilateral inguinal hernia repair surgery under spinal anaesthesia without additives. And patients who provided written consent for data collection.

Exclusion Criteria: Obese patients (BMI >35 kg/m²), Patients already receiving analgesics for chronic pain, Patients who refused to participate, Laparoscopic hernia**,** Bilateral hernia, and Obstructed hernia.

This was a prospective observational study in which consultant anaesthesiologists available during open hernia repair surgeries administered spinal anaesthesia without additives to the

- Patients according to departmental protocol. After the surgery was completed, the patients were transferred to the recovery room.
- Post-surgery, the consultant anaesthetist in charge of the patient provided either an ultrasound guided Lateral Transversus Abdominis Plane (TAP) block or Trans muscular Quadratus Lumborum (QL) block after the spinal anaesthesia had regressed to the T10-T12 level or when the patient's VAS (Visual Analog Scale) score was 2-3. Both techniques are established methods for pain relief following hernia repair surgery. In this observational study, patients were enrolled based on the technique already employed by the consultant anaesthesiologist.
- Patients who received ultrasound-guided Lateral TAP block were enrolled in Group T

and who received Trans muscular QL block were enrolled in Group Q.

According to the departmental protocol, the TAP block and QL block was administered using the following medications under USG: Injection bupivacaine (0.5%) - 15 ml, Injection dexamethasone (8 mg) - 2 ml, Injection distilled water - 15 ml = total 32 ml volume.

For The Ultrasound-Guided Lateral TAP Block: Following skin sterilization, a high-frequency ultrasound probe (5-13 MHz) was covered and positioned along the midaxillary line between the lower costal margin and the iliac crest. A 21 G-10 cm needle was then inserted medially, in-plane with the ultrasound beam, and guided toward the transversus abdominis plane. Once the needle tip was accurately positioned between the internal oblique and transversus abdominis muscles, the study drugs were injected (32 ml).

For The Ultrasound-Guided Trans Muscular Quadratus Lumborum Block: Following skin sterilization, a low-frequency ultrasound probe (2-5 MHz) was covered and positioned along the axial plane on the patient's flank just cranial to the iliac crest. The "shamrock sign" is visualized. A 21 G-10 cm needle is inserted using an in-plane technique from the posterior end of the transducer through the quadratus lumborum muscle. The injectate should ideally spread from the injection site inside the fascial plane between the quadratus lumborum and psoas major muscles. Once the needle tip was accurately positioned between the quadratus lumborum and psoas major muscles, the study drugs were injected (32 ml).

Pain assessments were documented for all patients at rest and during movement at 0, 2, 6, 12, and between 18 - 24 hours post-surgery and assess the hemodynamic changes during this various point of time in first 24 hours. The preoperative vitals were considered as baseline vitals.

The 0-hour time was considered the point when the patient first complained of pain with a VAS score 2-3 or regression to the T10 level of spinal anaesthesia. The study also recorded any additional post-operative analgesic requirements (injection paracetamol, injection tramadol, injection diclofenac as per surgery departmental protocol) and their timing post-operation in the ward. Total analgesic requirement within the first 24 hours postoperatively was documented. Any adverse events that occurred were also recorded in this observational study.

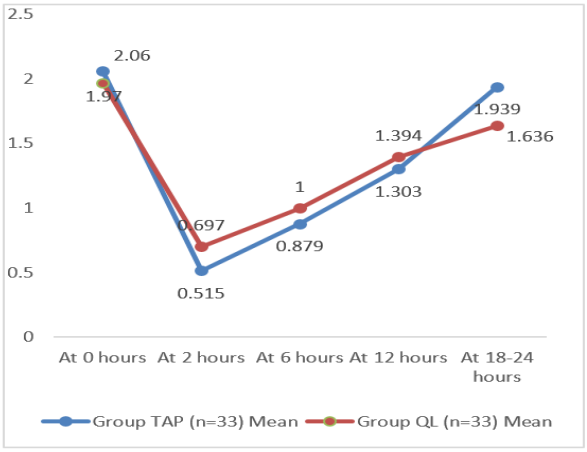
Statistical Analysis: All the data were entered in Microsoft Excel program work sheet. Mean and standard deviation were calculated for demographic data, vital parameters, Visual Analogue Scale (VAS) scores and dose of analgesic given post-operatively using Microsoft excel program, so all data presented in Mean ± SD form. Software use: - SPSS version-23. The 2 group were analysed by, parametric test - student t test and nonparametric test – chi square test. P <0.05 considered as statistically significant. P >0.05 considered as statistically insignificant.

Observation and Result:

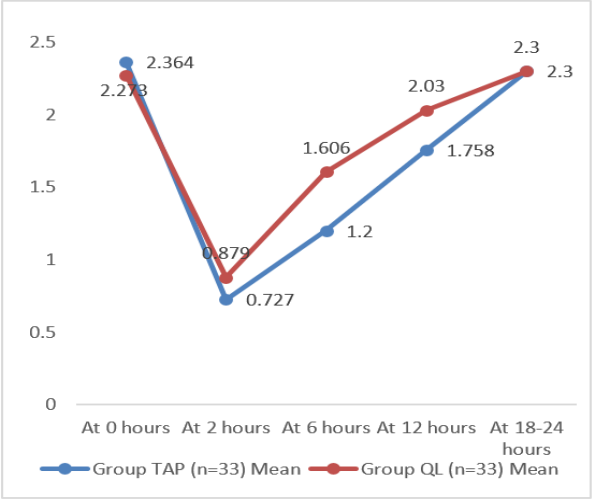
Table 1: Demographic Variables of Study Participants (AGE, WEIGHT, SEX):

Parameters		Group T (n=33)		Group Q (n=33)		P value
		Mean	SD (+)	Mean	SD (+)	
Age (years)		45.121	14.25	46.39	13.43	0.710
Weight (kg)		60.242	7.9	60.182	9.9	0.978
		Number	Percentage	Number	Percentage	
Sex	Male	33	100	33	100	-
	Female	0	0	0	0	

P value <0.05 = significant, P value >0.05 = Not significant

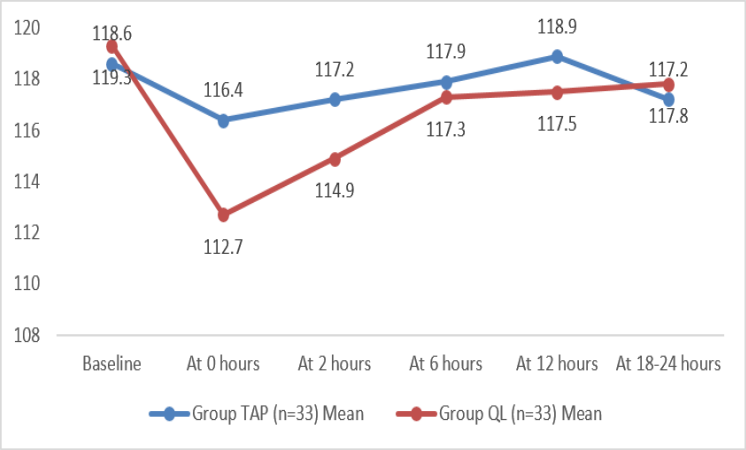


Graph 1: VAS Score (At Rest)



Graph 2: VAS Score (With Movement)

Overall, No Significant differences in pain scores were observed.



Graph 3: Mean Systolic Blood Pressure

Discussion

Managing postoperative pain after inguinal hernia surgery is essential for promoting recovery and enhancing patient satisfaction. Pain relief strategies should extend beyond the immediate postoperative period, focusing not only on short-term comfort but also on minimizing the likelihood of long-term, chronic pain.

Essential Element of Multimodal Analgesia in Enhanced Recovery After Surgery Guidelines Key points are Multimodal analgesia, Opiate – sparing analgesia, Pain management, Pharmacology, Regional anaesthesia [23].

Pain after abdominal or inguinal surgeries typically consists of two main components: somatic pain originating from the surgical incision and visceral pain arising from internal organs. The transversus abdominis plane (TAP) block entails the deposition of local anaesthetic within the fascial plane separating the internal oblique and transversus abdominis muscles. This effectively anesthetizes the nerves traversing this space, providing somatic analgesia to the anterolateral abdominal wall structures, including the skin, musculature, and parietal peritoneum, generally spanning the T7 to L1 dermatomal levels.

Whereas in the trans muscular quadratus lumborum (TQL) block placing the local anaesthetic drugs between the quadratus lumborum and psoas major muscles using an in-plane needle approach. This allows cranial spread into the thoracic paravertebral space, providing somatic and visceral analgesia from T4 to L1.

Pain is a highly subjective experience, and both perception and tolerance can differ greatly from person to person. Consequently, the demand for postoperative analgesia often varies, and this variability is a common consideration in everyday clinical practice.

After obtaining approval from the institutional ethical committee and written informed consent, patients aged 18-70 years, classified as American Society of Anesthesiologists (ASA) physical status I-III, who underwent elective unilateral open inguinal hernia repair, were enrolled. However, patients with multiple hernia repairs, bilateral inguinal hernia, obstructed or strangulated hernia, recurrent hernia and laparoscopic hernia were excluded.

Patients were enrolled, and data were collected according to the analgesic technique utilized by the consultant anesthesiologist. Patients who received an ultrasound-guided TAP block were assigned to Group T, while those who received an ultrasound-guided QL block were assigned to Group Q.

Upon analysis, there were no statistically significant variations observed between the two groups with respect to age, sex, body weight, ASA classification, or average surgical duration. This suggests that both groups were comparable at baseline, ensuring a balanced and unbiased comparison.

Baseline Vitals: In our study, a comparison of baseline vital parameters was conducted between Group T and Group Q. Overall, the lack of significant differences in heart rate, systolic, and diastolic blood pressures confirms that both groups had comparable baseline hemodynamic status, thereby reducing the likelihood that these variables influenced the study's outcomes.

VAS Analysis: This study evaluated the Visual Analogue Scale (VAS) scores for pain at rest and during movement across different time intervals following the intervention, comparing Group T and Group Q.

AT 0 HOUR: At the 0-hour, which corresponded to the regression of spinal anaesthesia to the T10–T12 dermatome level or when patients reported a pain score of 2–3 in the recovery room—the mean VAS score at rest was 2.06 ± 0.9 for Group T and 1.97 ± 0.95 for Group Q with P value is 0.70, and the mean VAS scores during movement were 2.36 ± 1.02 in Group T and 2.27 ± 1 in Group Q, with a P value of 0.71, indicating no significant difference in pain levels at rest and with movement between the two groups at this early postoperative stage.

VAS AFTER 2 HOURS: Two hours following surgery, the mean VAS scores at rest had declined to 0.51 ± 0.75 in Group T and 0.69 ± 0.58 in Group Q. The P value for this comparison was 0.27, indicating no statistically significant difference between the two groups in terms of resting pain but with p-values < 0.001 for both, indicating strong intragroup significance. These results suggest that both groups experienced minimal and comparable levels of pain at this postoperative time point. However, pain reductions were highly significant within each group as $p < 0.001$, indicating effective early postoperative pain relief. In 2022, Dr. Reena Makhni et al [1], analysed the postoperative pain scores at 2hour, pain scores remained low in both groups. The TAP group had a mean VAS of 0.43 ± 0.50, and the QL group reported a similar score of 0.40 ± 0.56. The comparison yielded no statistically significant difference ($p=0.40$), suggesting comparable analgesic efficacy in the early postoperative period. VAS AT 6 HOURS, Pain scores increased slightly in both groups as the Group T reported a mean score of 0.879 ± 1.05, and the Group Q had 1.00 ± 0.82, with continued statistical significance within both Groups P value was < 0.001. However, the intergroup comparison remained non-significant P value was 0.605, indicating continued comparability in pain control between the two blocks. Similar VAS result was found with movement showed. The following study have shown comparable finding vas at 6 hours: In 2021, Onur Okur et al[3] and in 2023, Shashirajsinh S. Vaghela et al[8], the comparison between Group T and Group Q showed no significant difference. In contrast to above study results, in 2023, Dr Arshi Taj et al[9], analysed the postoperative vas score at 6 hours, significant divergence in pain levels was observed. This difference was statistically significant ($p < 0.001$), indicating superior analgesia in Group QL during the mid-postoperative period.

VAS AT 12 HOURS: Pain levels at rest continued to rise gradually, with VAS scores of 1.303 ± 1.01

in the Group T and 1.394 ± 1.17 in the Group Q. The Group T maintained statistical significance in its intragroup comparison with a P value was 0.001, while the Group Q showed marginal significance with a P value was 0.045. Despite the slightly lower mean pain scores in the Group T, the intergroup P value of 0.737 indicates no significant difference in effectiveness between the two approaches and similar finding of pain scores with movement continued to increase slightly in both groups as a mean vas score of Group T was 1.758 ± 1.09 and vas score of Group Q was 2.03 ± 1.2.

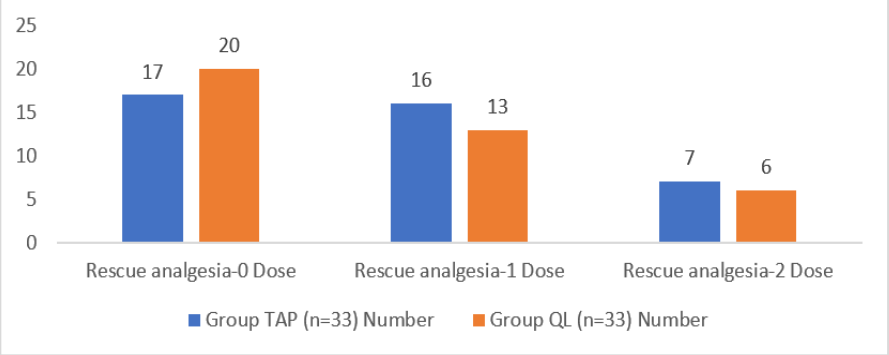
Similar finding observed in, in 2023, Dr. Arshi Taj et al [9], analysed the postoperative vas score at 12 hours, the trend reversed, with Group B (QL block) reporting higher pain levels (3.32 ± 0.980) compared to Group A (TAP block) (2.49 ± 1.451), again a statistically significant difference ($p < 0.001$). This suggests a weaning effect of analgesia in Group B (QL block) or a more sustained analgesic profile in Group A (TAP block) at this point. Following study have results contrast to our study, in 2022, CO Çaparlar et al[5], compare the postoperative pain score at 12 hours, pain levels in the pTAPB group, with a VAS score of 2.44 ± 0.49, while pQLB showed a lower score of 0.92 ± 0.28, and Control group scores increased further to 4.22 ± 0.18 ($P < 0.001$). This was one of the clearest points of differentiation in the analgesic profile. The pQLB group maintained excellent pain control, still under 1 on the VAS scale, while the pTAPB group remained in the 2–3 range (moderate pain), and Control patients experienced significant discomfort. FINALLY, 18–24 HOURS: By 18-24 hours postoperatively, the mean VAS scores at rest had increased further to 1.939 ± 1.32 in the Group T and 1.636 ± 1.14 in the Group Q, reflecting the expected wearing off of analgesic effects. However, neither group showed significant intragroup differences from earlier time points as P value of Group T was 0.680 and P value for Group Q was 0.239, and the intergroup comparison was again non-significant with P of 0.322. These findings suggest that while pain slightly increased, the analgesic effect of both blocks remained relatively mild and similar by 24 hours.

By the 18-24 hours period, both groups reported identical VAS scores with movement was 2.3 ± 1.35 in Group T and 2.3 ± 1.23 in Group Q and the intergroup p-value was 1, confirming no difference in pain scores at this time. Intragroup comparisons showed no significant changes as P value of group T was 0.835 and P value for Group Q was 0.923, indicating pain levels had plateaued and the effect of both blocks was tapering off.

Similar finding observed in, in 2021, Onur Okur et al [3], In 2022, Dr. Reena Makhni et al [1] and in 2023, Dr. Arshi Taj et al [9] presented a postoperative VAS score at the 24-hour mark that by the 24th postoperative hour, both groups maintained effective analgesia, indicating similar long-term pain control. Following study have results contrast to our study, in 2023, Shashirajsinh S. Vaghela et al [8], Finally, at 24 hours, Group A (QL block) had a mean VAS score of 2.22 ± 1.70, compared to 3.88 ± 1.45 in Group B (TAP block). This difference also reached statistical significance ($P = 0.001$).

Doses of Post-Operative/Rescue Analgesia

The current study assessed the frequency of postoperative rescue analgesia requirements between two groups of patients who received either a Transversus Abdominis Plane (TAP) block or a Quadratus Lumborum (QL) block. In Group Q, 60.60% of patients (n = 20) did not require any additional analgesia following surgery, compared to Group T 51.51% of patients (n =17). This suggests that the QL block provided more effective or longer-lasting analgesic coverage for post-operative hernia patients. Additionally, 39.39% patients (n =13) in the Group Q required one rescue dose of analgesia than in the 48.48% patients in Group T (n =16) and the number of patients needing two doses was also slightly lower in the Group Q (18.18%) (n = 6) compared to the Group T (21.21%) (n = 7).



Graph 4: Doses of Post-Operative/Rescue Analgesia:

Overall, these findings indicate that the QL block is associated with a reduced need for postoperative rescue analgesia.

This may be due to the QL block's potential to spread to the thoracolumbar fascia and paravertebral space, allowing for broader and more prolonged analgesia. These findings indicate that patients in Group Q had lower analgesic requirements compared to those in Group T, suggesting that the analgesic technique used in Group Q was more effective in managing postoperative pain in this hernia patients. Study done by Weheba and colleagues [20], comparing opioid consumption in the first 24h postoperative between two groups receiving QL and TAP block, it was found that there was no significant difference in cumulative fentanyl consumption at 24h between the two groups (P=0.527).

The postoperative cumulative fentanyl consumption at 24h in patients requiring postoperative opioids was 58.82±11.11µg in the QLB group and 62.14±17.50µg in the TAP group.

Study done by Verma et al [21], Blanco et al [22] found that after giving either TAP or QL block, requirement of postop tramadol, pethidine and morphine doses were too low.

Time of Post-Operative/Rescue Analgesia:

For the first dose of rescue analgesia, a statistically significant difference was observed between the two groups (P = 0.03).

In the Group T, 18.8% of patients (n = 3) required analgesia within the first 0–6 hours postoperatively, whereas none of the patients (n = 0) in the Group Q required analgesia within the first 0–6 hours postoperatively. Additionally, 69.2% of patients in the Group Q (n = 9) required their first dose between 6–12 hours, compared to 31.2% of the patients (n = 5) in the Group T.

Notably, 50% of the patients (n = 8) in Group T required their first rescue dose between 12–24 hours, compared to only 30.8% of the patients (n = 4) in Group Q. These findings suggest that the QL block provided a longer duration of effective analgesia than the TAP block in the early postoperative period.

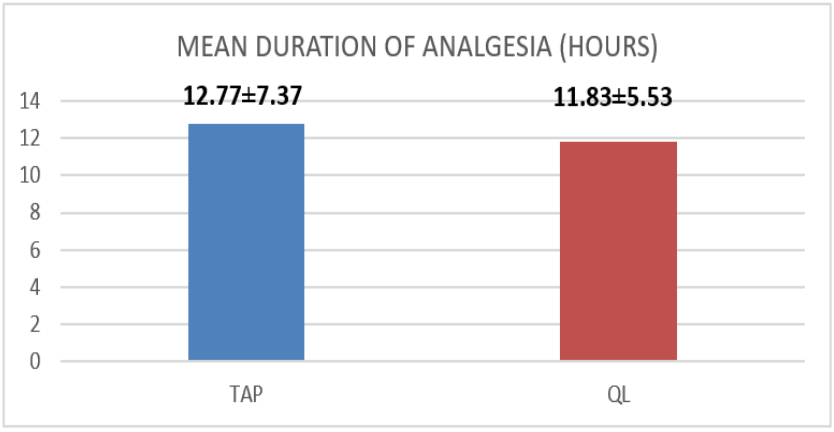
Table 2: Time of Post-Operative/Rescue Analgesia.

Rescue analgesia	Group T		Group Q		P value
	Number	Percentage	Number	Percentage	
1st Dose					
0-6 hours	3	18.8	0	0	**0.03**
6-12 hours	5	31.2	9	69.2	
12-24 hours	8	50	4	30.8	
2nd Dose					
0-6 hours	0	0	0	0	0.455
6-12 hours	2	33.3	0	0	
12-24 hours	5	71.4	6	100	

P value <0.05 = significant, P value >0.05 = Not significant

The duration of analgesia is influenced not only by the dose of the local anaesthetic and the quantity of additives such as dexamethasone but the clinician's skill in performing ultrasound-guided techniques. The addition of dexamethasone (8 mg) has been shown to extend postoperative pain relief. This prolonged effect may be attributed to several mechanisms, including its anti-inflammatory and immunosuppressive properties, perineural vasoconstriction—which can slow the systemic absorption of local anaesthetics—suppression of abnormal nerve firing, and modulation of potassium channels.

Mean Duration of Analgesia (Hours): The time to first analgesia, measured in hours, was compared between the Group T and Group Q. In the Group T (n=16), the mean time to first analgesia was 12.76 ± 7.36 hours, whereas in the Group Q group (n=13), it was 11.82 ± 5.53 hours. The difference found in both groups was statistically nonsignificant (P=0.707).



Graph 5: Mean Duration of 1st Post-Operative/Rescue Analgesia.

The Graph illustrates the mean duration of the first post-operative or rescue analgesia in hours for patients who received either a TAP (Transversus Abdominis Plane) block or a QL (Quadratus Lumborum) block. The Group T demonstrated a slightly longer mean duration of analgesia at 12.77 ± 7.37 hours, compared to 11.83 ± 5.53 hours in the Group Q. Although the TAP block provided a marginally longer duration of pain relief, the overlapping standard deviations suggest that this difference may not be statistically significant.

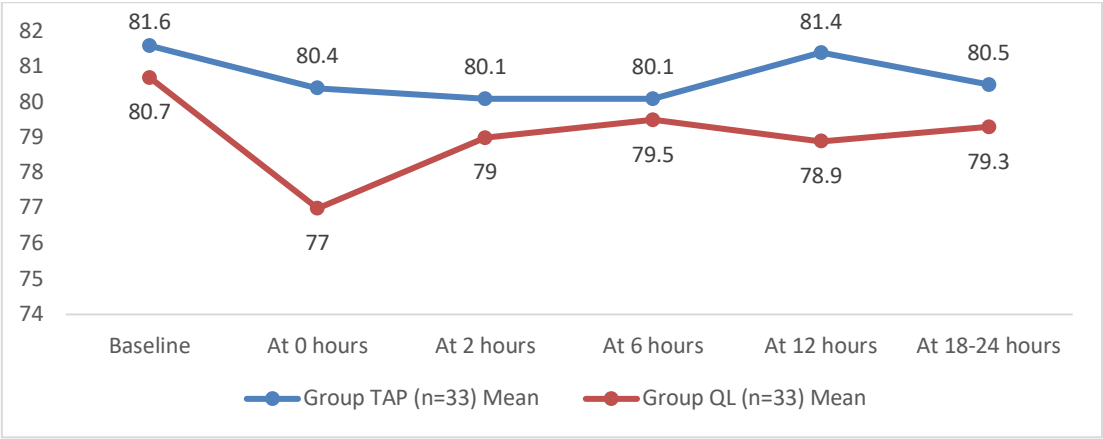
The time to second analgesia was recorded for both the Group T and Group Q. In the Group T (n=7), the mean time to second analgesia was 14.89 ± 3.82 hours. In comparison, the Group Q (n=6) had a longer mean duration of 18.25 ± 1.99 hours before requiring the second dose of analgesia. The difference found in both groups was statistically nonsignificant (P=0.080).

In 2022, Dr. Reena Makhni et al[1], analysed the mean duration of first analgesia was longer in Group Q which was demanded at 10.20 ± 2.11 hours as compared to the Group T was given at 6.45 ± 1.58 hour. The difference in the two groups was found to be statistically significant (P < 0.001). In 2023, Tarek Y. et al[9], found that the time to first pethidine request was significantly longer in Group Q (QLB) compared to Group T (TAPB). Patients in Group Q requested their first dose of pethidine at a mean time of 554.3 ± 200.7 minutes postoperatively, whereas those in Group T requested it much earlier, at 201.8 ± 171.3 minutes.

This difference was highly statistically significant (P < 0.001).

Heart Rate

In our study, the mean heart rate (HR) values for two groups, Group T and Group Q, measured at various time intervals (0-hour, 2-hour, 6-hour, 12-hours, and 24-hour postoperatively.).



Graph 6: Mean Heart Rate

At 0 hours postoperatively, a slight reduction in mean heart rate was observed in both groups. In the Group T, the mean heart rate decreased to 80.4 ± 11.6 bpm, which was not a statistically significant change compared to baseline (intragroup P = 0.537). However, in the Group Q, the heart rate dropped to 77 ± 10 bpm, and this reduction was statistically significant within the group (P = 0.04).

Despite this significant intragroup change in the Group Q, the difference between the two groups at

this time point remained statistically insignificant (intergroup P = 0.209), suggesting that the observed reduction in heart rate, although notable within the Group Q, was not markedly different from the Group T when compared directly. At 2 hours, at 6 hours, at 12 hours and at 18- 24 hours heart rates remained stable in both groups. Neither group exhibited a statistically significant intragroup change from baseline (P = P = 0.294), and the intergroup comparison also did not show a significant difference with P value of 0.66. Similar finding observed, In 2022, Dr. Reena Makhni et al[1], analysed that there were no statistically significant differences (P > 0.05) between the two groups in terms of mean heart rate.

SBP (Systolic Blood Pressure): In our study, the mean systolic blood pressure (SBP) between two groups, Group T and Group Q, at various time intervals (0-hour, 2-hour, 6-hour, 12-hours, and 24-hour) was measured.

At 0 hours postoperatively, Group T showed a slight decrease in SBP to 116.4 ± 10.7 mmHg, which was not statistically significant within the group (P = 0.363). In contrast, Group Q experienced a more pronounced drop to 112.7 ± 9.1 mmHg, which was statistically significant (P = 0.008). However, the difference between the two groups at this time point did not reach statistical significance (P = 0.138). At 2 hours, at 6 hours, at 12 hours and at 18- 24 hours, no significant changes were observed within either group (P = 0.440 for Group T and P = 0.217 for Group Q), and the difference between groups remained non-significant (P = 0.816). In 2022, Dr. Reena Makhni et al[1], analysed that there were no statistically significant differences (P > 0.05) between the two groups in terms of blood pressure.

DBP (Diastolic Blood Pressure): In our study, the mean diastolic blood pressure (DBP) values for two groups, Group T and Group Q, measured at five different time intervals: 0, 2, 6, 12, and 24 hours. At 0 hours, immediately following the block, Group T recorded a slight reduction in DBP to 75 ± 6.6 mmHg, while Group Q showed a similar value of 74.6 ± 5.8 mmHg. These changes were not statistically significant within either group (P = 0.396 for Group T and P = 0.09 for Group Q), nor was there a significant difference between the two (P = 0.813), indicating comparable early hemodynamic effects. At 2 hours, at 6 hours, at 12 hours and at 18-24 hours postoperatively, Group T's DBP slightly decreased to 75.7 ± 5.6 mmHg, while Group Q showed a value of 77.1 ± 5.4 mmHg. These small fluctuations again did not reach statistical significance within (P = 0.447 for Group T and P = 0.627 for Group Q) or between the groups (P = 0.310).

Side Effects: In the current study, patients did not exhibit any side effects or complications. The TAP block and QL block were well-tolerated, with no indications of toxicity, hematoma, injection site pain, or infection. This finding underscores the safety profile of the interventions employed in the study, suggesting that both approaches can be considered equally safe in clinical practice, with minimal risk of adverse effects or procedural difficulties. Similar finding observed in, Reena Makhni etal [1] 2022 and in 2023, Avishek Roy et al [10], it was observed that there were no statistically significant differences (P > 0.05) between the two groups.

Conclusion

From this study, it was observed that both TAP (Transversus Abdominis Plane) and QL (Quadratus Lumborum) blocks, performed under ultrasound guidance (USG), provided effective postoperative analgesia.

It can be concluded that both TAP and QL blocks offer adequate postoperative pain relief for adult patients undergoing open inguinal hernia surgery. The two block techniques demonstrated comparable results over 24 hours, both at rest and during movement. Hemodynamic parameters remained stable throughout study and showed no statistically significant differences between the groups. The average time to first analgesic requirement was approximately Twelve hours in both groups. No adverse event was observed, confirming the safety of both techniques.

Overall, TAP and QL blocks are equally effective in managing postoperative pain, with neither technique showing superiority over the other.

Strength of the Study: Ultrasound Guidance Well-Matched Groups TAP and QL blocks. Objective and Reproducible Metrics: Pain was measured using the standardized Visual Analog Scale (VAS), making the findings more reliable and reproducible. Adequate Sample Size: A calculated and enough participants (n=66) were included based on statistical power analysis with no dropouts. There was 100% follow-up with no side effects or procedural complications observed, enhancing the credibility of results.

Limitations of Study: Only male participants were included, limiting generalizability to female patients. The study only assessed pain and analgesia requirement for 24 hours, excluding long-term outcomes. Conducted at one tertiary care centre, which may not reflect broader population dynamics or institutional variations. The success and accuracy of blocks specially Quadratus lumborum (QL) placement heavily depend on the expertise of the anaesthesiologist. Patient and

surgeon satisfaction score can be taken for post op pain relief.

Implications of The Study: Foundation for Further Research: Provides a basis for future randomized controlled trials including diverse demographics and longer follow-ups. Advancement in Pain Management within ERAS Protocols: The study supports the integration of ultrasound-guided nerve blocks into Enhanced Recovery after Surgery (ERAS) protocols, promoting effective postoperative pain control and contributing to faster patient recovery following abdominal procedures. A catheter can be inserted to prolong the duration of the QL block, especially in extensive surgeries like hysterectomy, and it can be compared with other regional analgesia techniques.

Bibliography

1. Makhni R, Attri JP, Kaur H, Markam KK. Comparison of ultrasound-guided transversus abdominis plane (TAP) block and quadratus lumborum (QL) block in inguinal hernia surgery. Indian J Anaesth. 2022 Mar;66(Suppl 2):S122–25.
2. Abdelhady, Mohamed & Omar, Sherif & Afifi, Monir & Eldin, Kariman. (2023). Comparison between quadratus lumborum and transversus abdominus plane blocks for analgesia in abdominal surgeries. Research and Opinion in Anesthesia & Intensive Care. 10. 197-202.
3. Okur O, Karaduman D, Tekgul ZT, Koroglu N, Yildirim M. Posterior quadratus lumborum versus transversus abdominis plane block for inguinal hernia repair: a prospective randomized controlled study. Braz J Anesthesiol. 2021 Sep-Oct;71(5):505-10.
4. Xue Q, Chu Z, Zhu J, Zhang X, Chen H, Liu W, et al. Analgesic Efficacy of Transverse Abdominis Plane Block and Quadratus Lumborum Block in Laparoscopic Sleeve Gastrectomy: A Randomized Double-Blinded Clinical Trial. Pain Ther. 2022 Jun;11(2):613–26.
5. Caparlar CO, Altinsoy S, Akelma FK, Ozhan MO, Ergil J. Posterior quadratus lumborum block versus posterior transversus abdominis plane block for unilateral inguinal hernia surgery. Niger J Clin Pract. 2022 Sep;25(9):1457-65.
6. Abdelbaser I, Salah DM, Ateyya AA, Abdo MI. Ultrasound-guided transversalis fascia plane block versus lateral quadratus lumborum plane block for analgesia after inguinal herniotomy in children: a randomized controlled non-inferiority study. BMC Anesthesiol. 2023 Mar 17;23(1):82-90.
7. Taj, Arshi & Malla, Mohammad Sadiq & Khan, Naveed. (2023). A Prospective Observational Study to Evaluate Efficacy of Transversus Abdominis Plane Block and Quadratus Lumborum Block.Journal of Cardiovascular Disease Research: vol 14, issue 04, 2023:483-90.
8. Vaghela SS, Chaurasiya MK, Prakash R, Khan MP. Ultrasound-Guided Quadratus Lumborum Block Versus Transversus Abdominis Plane Block for Laparoscopic Inguinal Hernia Repair and Appendicectomy Using Ropivacaine With Dexmedetomidine. Cureus. 2023 Jan;15(1):33450:1-8.
9. Abdel Moniem TY, Hamid HSA, Halem S, Attia ES, Fahmy NG. A randomized comparative study of ultrasound-guided quadratus lumborum block versus transversus abdominis plane block in patients undergoing paraumbilical hernia repair. Egyptian Journal of Surgery, 2022, Vol 41, Issue 3:920-26.
10. Roy A, Bhoi D, Chhabra A, Mohan VK. Quadratus lumborum block vs. transversus abdominis plane block in laparoscopic trans-abdominal pre-peritoneal repair of inguinal hernia in adults: A randomised controlled trial. Indian J Anaesth. 2023 Feb;67(2):207–15.
11. Bilgin S, Aygun H, Genc C, Dost B, Tulgar S, Kaya C, et al. Comparison of ultrasound-guided transversalis fascia plane block and anterior quadratus lumborum block in patients undergoing caesarean delivery: a randomized study. BMC Anesthesiol. 2023 Jul 21; 23(1): 246:1-8.
12. Sørenstua M, Raeder J, Vamnes JS, Leonardsen ACL. Efficacy of a TAP block versus an anterior QLB for laparoscopic inguinal hernia repair: A randomised controlled trial. Acta Anaesthesiol Scand. 2023 Feb;67(2):221–9.
13. Mohamed S, Badawy ME, Hadidi AE. Post-Operative Analgesia in Inguinal Hernia Repair by Quadratus Lumborum Versus Transversalis Fascia Block. Al-Azhar Int Med J [Internet]. 2024 May 31;5(5)/58:345-52
14. Elsayed Elashry H, Abdelbadie M, Ali Elshabacy A, Ali Elmiseery O. Analgesic Effect of Quadratus Lumborum Block Type III and Type II Versus Lateral Transversus Abdominis Plane Block in Cesarean Section: A Randomized Controlled Multicenter Trial. Anesthesiol Pain Med. 2024 Feb;14(1):14 0464:1-10.
15. Abdelmaboud AMA, Ahmed AM, Mousa AA, Mahmoud WA. Efficacy of quadratus lumborum block as a relatively new analgesic technique in patients undergoing open inguinal hernia surgical repair. Res Opin Anesth Intensive Care. 2024 Sep;11(3):168-175.
16. Richard L Drake, editors. Gray's Anatomy for students, 4th edition: Amsterdam: Elsevier; 2020. 276-288 p.
17. Admir Hadzic; Hadzic's Peripheral Nerve Blocks and Anatomy for Ultrasound-Guided

Regional Anesthesia - second edition, Page no. - 323-333, 460-462,642-49
18. NYSORA Hesham Elsharkawy and Thomas F. Bendtsen. Ultrasound-Guided Transversus Abdominis Plane and Quadratus Lumborum Nerve Blocks [Internet]. NYSORA. 2018 [cited 2025 May 18].
19. Mahajan BK. Methods in Biostatistics for Medical Students and Research Workers. 8th ed. New Delhi: Jaypee Brothers Medical Publishers; 2010. p. 66–85.
20. Weheba HE, Abdelsalam T, Ghareeb S, Makharita MY. Posterior quadratus lumborum block versus subcostal transversus abdominis plane block in laparoscopic cholecystectomy. Int J Anesthetic Anesthesiol. 2019;6:093.
21. Verma K, Malawat A, Jethava D, Jethava DD. Comparison of transversus abdominis plane block and quadratus lumborum block for post-caesarean section analgesia: A randomised clinical trial. Indian J Anaesth. 2019 Oct;63(10):820-26.
22. Blanco R, Ansari T, Riad W, Shetty N. Quadratus Lumborum Block Versus Transversus Abdominis Plane Block for Postoperative Pain After Cesarean Delivery: A Randomized Controlled Trial. Reg Anesth Pain Med. 2016 Nov/Dec;41(6):757-762.
23. Beverly A, Kaye AD, Ljungqvist O, Urman RD. Essential Elements of Multimodal Analgesia in Enhanced Recovery After Surgery (ERAS) Guidelines. Anesthesiol Clin. 2017 Jun;35(2):115-43.
24. Stoelting K. et al: Pharmacology and physiology in anaesthesia practice, Anaesthesiology Textbook south Asian edition adaption of 6th international edition (Wolters kluwer); Chapter-10;p.277-09.
25. Brunton LL, Lazo JS, Parker KL. Local anaesthetic In: Goodman and Gilman ‘s. The pharmacological basis of therapeutics. 11edn. 2006; p.369-87.
26. K.D. Tripathi, Essentials of Medical Pharmacology, 8th edition 2019; chapter 26:386-398, chapter 20:306-19.
27. Honorio Benzon , James Rathmell, Practical Management of Pain 6th edition 2022.