

A Comparison between Ultrasound Guided Quadratus Lumborum Block versus Transversus Abdominis Plane Block for Postoperative Analgesia in Inguinal Hernia Repair

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Abstract: ***Background and Aims:** Inguinal hernia repair is a common surgical procedure, but it is often accompanied by acute to chronic postoperative discomfort. Effective pain management has shown to improve the quality of post operative management. Newly discovered peripheral blocks such as Transversus Abdominis Plane (TAP) block and Quadratus Lumborum (QL) block have gained immense popularity as an adjunct to regional and general anaesthesia for postoperative pain management and reducing analgesic requirements. We aimed to compare the duration of analgesia in ultrasound guided unilateral transverse abdominis plane (TAP) block versus unilateral QL block in patients undergoing laparoscopic Inguinal hernia repair. **Methods:** After obtaining institutional ethical committee clearance and clearance from head of the department, the study was started. 60 patients (ASA I and II) undergoing laparoscopic inguinal hernia repair were randomly divided into 2 groups of 30 each. After general anaesthesia, under ultrasound guidance Group TAP patients received TAP block and Group QL received QL block. Patients were monitored for Visual Analogue Scale (VAS) scores at 0, 15 minutes, 30 minutes, 1st, 2nd, 6th, 12th and 24th hour postoperatively, time for first analgesic requirement, and total analgesic requirement in 24 hours VAS score more than 3 received rescue analgesia. **Result:** Patients in group QL and group TAP had a mean duration of analgesia of 18.53 ± 2.596 hours and 7.83 ± 1.510 hours respectively, VAS for pain was significantly higher in Group TAP than QL at all times, p=0.0001, 16 patients (53.3%) from group QL and 24 patients (80%) from TAP, requested for rescue analgesia, the mean dose of tramadol consumed was 53.3 milligrams, 183.33 milligrams in Group QL & TAP. **Conclusion:** QL block provided longer postoperative analgesia, better VAS scores, with less opioids consumption compared with TAP block, in patients undergoing Inguinal hernia repair.*

Keywords: Quadratus lumborum block, Transversus Abdominis Plane block, Post Operative Analgesia.

1. Introduction

Regional anaesthesia techniques are effective alternatives to achieve post - operative analgesia. Transversus Abdominis Plane Block or Quadratus Lumborum Block has emerged as a safe and effective regional anaesthesia modality for providing post - operative analgesia in lower abdominal surgeries in adults.

Today improved understanding of Ultrasonography promotes visualization of anatomical structures in real time, it has resulted in better performance of regional blocks. As part of the multimodal analgesic strategy, the transversus abdominis plane (TAP block) has been used for post - operative pain control in a variety of abdominal procedures. It provides effective pain relief for the body without affecting internal organs. [1 - 3]

Blanco (2007) first described the Quadratus lumborum (QL) block as a method for local anesthetic application to the posterior abdominal wall. Transversus abdominis plane block and quadratus lumborum block have been compared in a

number of randomized controlled trials for postoperative analgesia in recent years. But these experiments' outcomes haven't always been constant. [4 - 8]

2. Aim and Objectives

Aim

The aim of the present study is to compare the postoperative analgesic effect of the ultrasound - guided trans muscular quadratus lumborum (QL) block versus transversus abdominis plane (TAP) plane block the in patients undergoing unilateral inguinal hernia repair.

Objectives

- 1) Duration of Postoperative analgesia
- 2) Changes in haemodynamic parameters
- 3) Need for rescue analgesia

3. Material and Methods

The study involved male patients aged 18 to 60 who were undergoing elective inguinal hernia repair procedures and had

an American Society of Anaesthesiologists (ASA) physical status I or II.

The sample size was calculated on the basis of duration of postoperative analgesia as the primary outcome measure. The calculated sample size at 95% confidence and 80% power is 4 in each group. However, in order to increase the confidence of study, we intended the sample size to be 30 in each group. Total number of 60 male patients selected for the study were randomly divided into two groups – Group QL and Group TAP and each group was allotted thirty patients (n = 30) each.

Group QL n = 30 Received ultrasound guided transmuscular quadratus lumborum block.

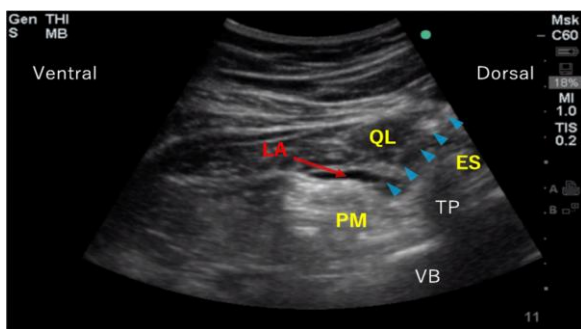
Group TAP n = 30 Received ultrasound guided lateral transversus abdominis plane block.

General anaesthesia (GA) was induced with fentanyl (2 mcg/kg), propofol (1.5–2.5 mg/kg), and vecuronium (0.05 mg/kg). An endotracheal tube (ETT) was inserted, and controlled ventilation was adjusted to maintain normocapnia. Anaesthesia was maintained with isoflurane and boluses of vecuronium (0.02 mg/kg). A prophylactic antibiotic and antiemetic was given after induction of GA.

All blocks were performed on patients, following GA induction and ETT insertion, under the guidance of a digital ultrasonic diagnostic imaging system, using a curvilinear probe (QL block) / linear probe (TAP block) and a 100 - 150 mm short - bevel 22 G echogenic needle.

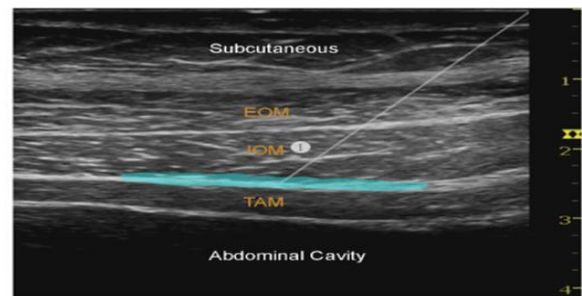
All patients were explained about the procedure, VAS scoring system and any concerns were clarified in the preop room. Informed and written consent was taken.

Transmuscular Quadratus Lumborum block – The patient was positioned in the lateral position, with the side to be anesthetized being located upward. An ultrasound device was used, in which a convex probe was used. A spinal needle (20G) was inserted in - plane from the posterior to anterior direction, and the tip of the needle was advanced through the QL muscle, penetrating the ventral proper fascia of the QL muscle. The target site for injection was the plane between the quadratus lumborum and psoas major muscles. After negative aspiration, 2 mL of normal saline was injected to confirm the correct separation of the plane. Later, 30 mL of 0.25% bupivacaine was injected into this plane.



Transversus Abdominis Plane Block The patient was positioned in the supine position. A 20G spinal needle was directed to approach the TAP using the “in - plane” USG -

guided technique. Once the tip of the needle was placed in the space between the IOM and TAM at the closest point to the QL muscle, after ensuring the needle placement, a negative aspiration was done, and 2 mL of normal saline was injected to confirm the correct separation of the plane, and 30 mL of 0.25% bupivacaine was injected



The intensity of post - operative pain was recorded for all the patients by an investigator blinded to the allotment, using visual analogue scale (VAS) score (0 = no pain and 10 = worst possible pain) at various predetermined time intervals (2, 4, 6, 12, 24hrs). The ‘time for first analgesic requirement’ was noted, considering the completion of block procedure as ‘Time 0’. Rescue analgesia was considered in when VAS >3. Intravenously Tramadol in the bolus of 100 mg was administered for the same. The total consumption of analgesic (tramadol) in terms of the number of doses in 24 hours was calculated for each patient.

4. Results

Table 1: Comparison of participants with respect to mean total duration of analgesia (in hours) (N=60)

	Group QL (n=30) in hours	Group TAP (n=30) in hours	t value	P Value
Mean Duration of Analgesia	18.53 ± 2.596	7.83 ± 1.510	19.512	.0001

Table 1 shows the mean total duration of analgesia (in hours) in Group QL was 18.53 ± 2.596 hours, whereas in Group TAP it was 7.83 ± 1.510 hours. In terms of the mean duration of analgesia (in hours), there was a statistically significant difference between the groups. Participants in Group QL had a longer (in hours) block time in hours,

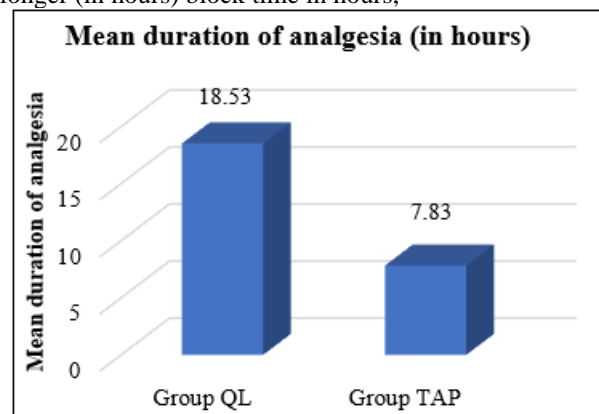


Figure 1: Bar graph showing distribution of participants with respect to mean total duration of analgesia (in hours) (N=60)

Table 2: VAS score in study participants postoperatively (N=60)

Time interval	Group QL (n=30)	Group TAP (n=30)	t value	P Value
Immediately post-operatively	4.73±0.450	4.67± 0.479	.273	.555
15 minutes	2.33± 0.479	2.70± 0.596	1.759	.681
30 minutes	1.30± 0.466	1.33± 0.479	- .273	.786
1 Hour	1.00±.000	1.03± 0.183	- 1.000	.321
2 Hour	1.00±.183	2.07±.254	- 18.107	.0001
6 Hour	1.33±.606	3.60±.498	- 18.385	.0001
12 Hour	2.53±.860	3.47±.507	- 15.817	.0001
24 Hour	3.20± 0.466	4.03±.809	- 5.118	.0001

Table 2 shows the mean VAS scores for Group TAP remained significantly higher than Group QL at 2 hours (Group QL = 1.00±.183, Group TAP= 2.07±.254, p =.0001), 6 hours (Group QL = 1.33±.606, Group TAP= 3.60±.498, p =.0001), 12 hours (Group QL = 2.53±.860, Group TAP= 3.47±.507, p =.0001), and 48 hours (Group QL = 3.20± 0.466, Group TAP= 4.03±.809, p =.0001).

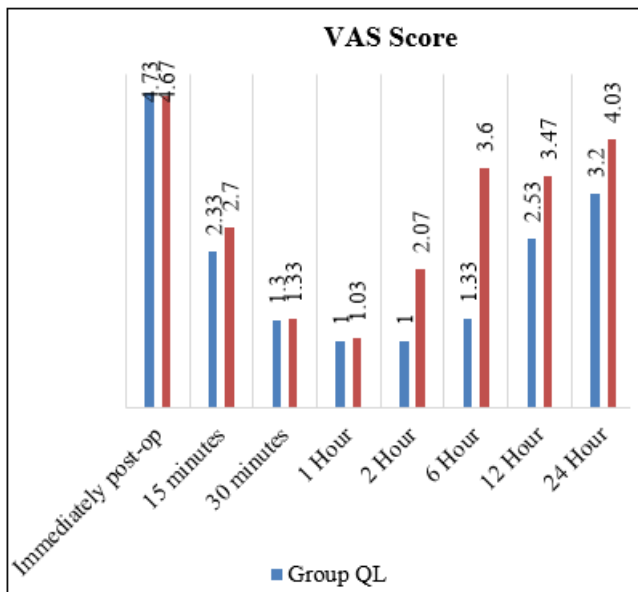


Figure 2: Bar graph showing VAS score in study participants postoperatively (N=60)

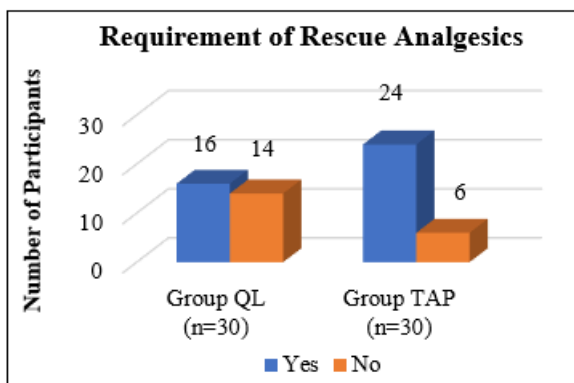


Figure 3: Bar graph showing distribution of participants with respect to requirement of rescue analgesic with the

Table 4: Comparison of participants with respect to mean dose of rescue analgesic administered (in milligrams) (N=60)

Mean dose of rescue analgesic administered (in grams)	Group QL (n=30)	Group TAP (n=30)	t value	P Value
Mean ± S. D.	53.33±50.74	183.33± 111.67	- 5.805	.0001

Table 4 the mean dosage of rescue analgesic administered in Group QL was 53.33±50.74 milligrams, whereas in Group TAP it was 183.33± 111.67 milligrams.

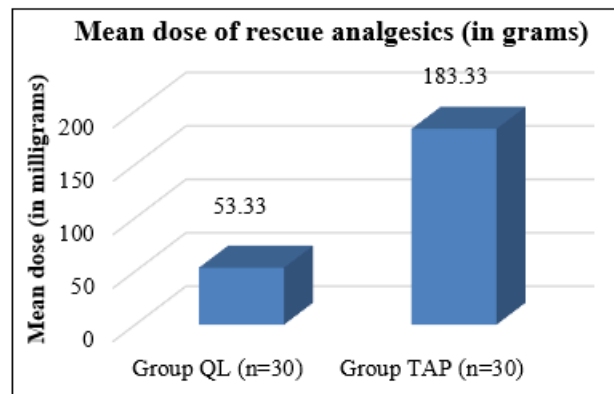


Figure 4: Bar graph showing mean dose of rescue analgesic administered (in grams) (N=60)

5. Discussion

The time taken to administer the first dose of tramadol as a rescue analgesic in the postoperative period was considered as duration of analgesia (in hours). In Group QL it was 18.53 ± 2.596 hours, whereas in Group TAP it was 7.83 ± 1.510 hours. There was a statistically significant difference between the groups. Group QL had a longer duration of analgesia in comparison to Group TAP, making QL block a superior choice for postoperative analgesia. The similar findings were seen in studies done by Vaghela S S et al. [9] and Mohamed A. N et al [10].

We recorded VAS score at immediate postoperative period, 2, 4, 6, 12 and 24 hour time intervals. We found that at the immediate postoperative period the VAS scores were 4.73±0.450, 4.67± 0.479 (p) for groups QL & TAP respectively. There was no significant difference observed, while there was significant differences at 2 hours (group QL = 1.00±.183, group TAP = 2.07±.254, p =.0001), 6 hours (group QL = 1.33±.606, group TAP = 3.60±.498, p =.0001), 12 hours (group QL = 2.53±.860, group TAP = 3.47±.507, p =.0001), and 24 hours (group QL = 3.20± 0.466, group TAP = 4.03±.809, p =.0001) indicating that the patients in group QL had lower pain scores (VAS) in comparison to group TAP. These similar findings were seen in studies of Kumar GD et al. [5] and Alansary AM et al. [11].

In our study rescue analgesia given was injection tramadol 100 mg, it was administered to the patient when the VAS score was >3. In Group QL the mean dosage was 53.33±50.74 milligrams, whereas in Group TAP it was 183.33± 111.67 milligrams. The participants in Group TAP needed a higher dosage of rescue analgesic, as indicated by the significant difference (t = - 5.805, p = 0.001). The results in our study

were similar with those done by Fargaly OS et al. [12] and Verma et al. [13]

In our study, 16 patients from Group QL, 24 patients from Group TAP received rescue analgesic inj. tramadol 100 mg. Group TAP had a higher number of patients requiring rescue analgesia. This difference was statistically significant ($p=0.028$). In a similar study by Yousef et al. [8] Group TAP had a higher number of patients requiring rescue analgesia than Group QL.

6. Conclusions

The current study came to the conclusion that quadratus lumborum block has several advantageous effects in comparison to transversus abdominis plane block in laparoscopic inguinal hernia repair. These advantages include longer duration of postoperative analgesia, a lower pain score (VAS score), the need for first rescue analgesia after a longer period of time, and a lower total amount of dose required for rescue analgesia.

Quadratus lumborum block encourages early ambulation and less hospital stay without any significant side effects.

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