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Original Research Article

Extrafascial Quadratus Lumborum Block versus Subfascial Quadratus Lumborum Block for Post-Operative Pain in Tertiary Care Centre

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Abstract:

Introduction: Recently, novel blocks have been suggested as effective analgesic options for both laparoscopic and open nephrectomy procedures. These techniques, including the Quadratus Lumborum Block (QLB), have been integrated into the multimodal analgesia approach for postoperative pain control. Blanco developed the QLB, and it has been proposed as an alternative analgesic method for various surgical procedures.

Aim and Objectives: To compare the safety, efficacy and adverse effects of extrafascial quadratus lumborum vs subfascial quadratus lumborum block for postoperative pain relief.

Material and Methods: This prospective comparative study was done on 80 patients undergoing surgical interventions. Patients were taken into the operating theatre after confirming that they had fasted for 8 hours before the surgery and underwent a brief preoperative review examination. The anesthesia approach for all patients was standardized. Standard monitors such as non-invasive blood pressure (NIBP), electrocardiogram (ECG), and pulse oximeter were attached, and their baseline vital signs were recorded.

Result: The mean duration of performing block in group 1 was 6.7±1.32 min, whereas in group 2 it was 9.45±1.76 min, On comparing there is significant difference with p value <0.01. The mean number of rescue analgesia in group 1 was 3.75±0.54 min, whereas in group 2 it was 3.3±0.46 min, with significant difference between two groups. Time for first rescue analgesia in group 1 was 4.55±0.90 min, and in group 2 it was 5.7±0.96 min with significant difference with p value <0.01.

Conclusions: In summary, the study concludes that the quadratus lumborum block provides longer duration of analgesia, which is evident by the time for the requirement of first analgesia. The significant reduction in total VAS score(for 24 hours) and number of rescue analgesia for QL block as compared to TAP block also suggest s that QL block afforts better quality of analgesia.

Keywords: TAP block, extrafascial, subfascial, QL block, VAS score.

Introduction

After surgical procedure, despite the use of multimodal analgesia, some patients still experience severe pain. Regional anesthesia techniques have shown promise in improving postoperative pain management and reducing the need for opioids in patients undergoing renal surgery. Recently, novel blocks have been suggested as effective analgesic options for both laparoscopic and open nephrectomy procedures. These techniques, including the Quadratus Lumborum Block (QLB), have been integrated into the multimodal analgesia approach for postoperative pain control. [1] Blanco developed the QLB, and it has been proposed as an alternative analgesic method for various surgical procedures. Although multiple approaches to QLB have been described, only a few randomized controlled trials have specifically evaluated its use in surgical procedures. Additionally, there have been variations in the type of block, injection site, and postoperative pain management protocols in these trials. [2]

The terms "extrafascial" and "subfascial" refer to the specific anatomical location of the injection during a quadratus lumborum block (QLB). QLB is a regional anesthesia technique that involves the administration of a local anesthetic near the quadratus lumborum muscle in the lower back to provide analgesia for various surgical procedures or for postoperative pain management. [3]

In an extrafascial QLB, the local anesthetic is injected outside the fascial layer that covers the quadratus lumborum muscle. The fascia acts as a protective layer surrounding muscles and organs and has a tough, fibrous structure. By depositing the local anesthetic outside this fascial layer, the spread of anesthesia may cover multiple nerves,

including the thoracolumbar nerves, subcostal nerve, and iliohypogastric and ilioinguinal nerves. This allows for a broader distribution of analgesia, which can be beneficial for procedures involving the lower abdomen, inguinal region, and hip surgeries. [4]

In contrast, during a subfascial QLB, the local anesthetic is injected below the fascial layer and directly into the space between the quadratus lumborum muscle and the thoracolumbar fascia. This approach targets the nerves within the muscle plane, such as the thoracolumbar nerves, providing analgesia primarily to the abdominal wall and thoracic region. [5] It's important to note that both blocks have variations in terms of injection location and technique, and the specific choice may depend on the surgeon's preference, the patient's anatomy, and the surgical procedure being performed.

Benefits of these blocks may include reduced opioid consumption, improved pain control, and earlier mobilization after surgery. However, as with any medical procedure, there can be risks and potential complications, such as infection, bleeding, and nerve injury,

Aim and Objectives

To compare the safety, efficacy and adverse effects of extrafascial quadratus lumborum vs subfascial quadratus lumborum block for postoperative pain relief.

Material and Methods

This prospective comparative study was done on 80 patients undergoing surgical interventions in the Department of Anaesthesia, All India institute of Medical Sciences New Delhi. The approval of the Institutional Ethical Committee was attained.

Group 1 - Extra fascial quadratus lumborum Block, n=40. Group 2 - Subfascial Quadratus Lumborum Block, n=40

Pre-Anaesthetic Evaluation

Pre-anaesthetic assessment was done recording a detailed history and performing a complete physical examination. Complete blood count, renal function test, blood grouping/typing, random blood sugar, electrocardiograph and chest x-ray were done. Patients not fulfilling the inclusion and exclusion criteria were excluded from the study. Written informed consent was obtained from all patients.

Inclusion criteria

1. Age: 18-40 years
2. Male patients undergoing surgical Intervention
3. American society of anaesthesiologists status: Grade 1,2,3

Exclusion criteria

1. Patient refusal
2. Patients with coagulopathy
3. Patients with local skin infections over abdominal wall
4. Chronic preoperative opioid consumption

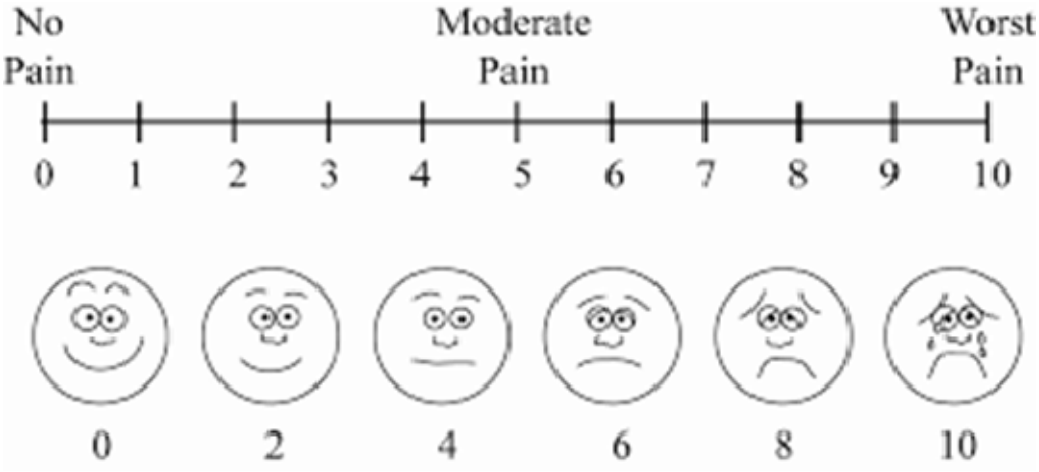
Methodology

Patients were taken into the operating theatre after confirming that they had fasted for 8 hours before the surgery and underwent a brief preoperative review examination. The anesthesia approach for all patients was standardized. Standard monitors such as non-invasive blood pressure (NIBP), electrocardiogram (ECG), and pulse oximeter were attached, and their baseline vital signs were recorded. An intravenous (IV) line was established using an 18G IV cannula, and 0.9% normal saline was administered. Spinal anesthesia was administered to all patients using 2ml of 0.5% bupivacaine injection along with 0.5ml (50 mcg) of fentanyl injection.

After the surgery, under strict aseptic measures, Extrafascial quadratus lumborum block and subfascial quadratus lumborum block were performed in their respective groups while the patients were in a supine position. During the postoperative period, the Visual Analogue Scale (VAS) scores were recorded at various time points (0, 1, 2, 4, 8, 12, and 24 hours). If a patient's VAS score was ≥ 4 out of 10 points (where 0 represented no pain and 10 represented very severe pain), they were administered intramuscular Tramadol at a dose of 2mg/kg in both groups.

The total amount of analgesic required in 24 hours was also recorded and compared between the two groups.

Visual Analog Score



In post-operative ward, when a patient developed pain of Visual Analogue Scale (VAS) ≥ 4, in a 10 point scale (where 0, none; 10, very severe) intramuscular Tramadol was administered at 1mg/kg in both the groups. The VAS scores were recorded at 0, 1, 2, 4, 6, 8, 12 and 24 hours. The time of requirement of 1st dose of rescue analgesic was noted and it was taken as the duration of analgesia provided the two blocks. The total doses of analgesic required in 24 hours was also noted and compared between the two groups.

After collecting the data, all the variables are examined for outliers and non-normal distributions. The Categorical variables are expressed as Frequency and Percentage. The Quantity variables are expressed as mean and standard deviation. Descriptive statistics are used to evaluate baseline characteristics. Student's t-test was used to calculate p value. Discrete variables were analyzed using Chi-Square test and Mann Whitney U test with a $P < 0.05$ considered statistically significant. The statistical analysis was performed using statistical software package SPSS 20.0

Observations

The sample size for this study was 80 which was divided randomly into 2 groups, namely Group 1(Extrafascial Quadratus lumborum) and Group 2(Subfascial Quadratus lumborum block).All the blocks performed were successful.

Demographic parameters i.e.age and sex (only male patients were included) showed no significant differences in the two groups. The duration of surgery with mean duration for both groups at 105 minutes and p value of 0.9581was statistically insignificant.

Table 1: Mean Duration of Surgery in Study Subjects

Duration of Surgery (In Minutes)	Group 1	Group 2
Mean	105±8.91	**105±8.04**
P Value 0.9581		

Table 1 shows Mean Duration of Surgery in Study Subjects, The mean duration of surgery in group 1 was 105±8.91 min, whereas in group 2 it was 105±8.04 min, On comparing there is non-significant difference between two groups with p value 0.958.

Table 2: Duration of Performing Block in the Study Subjects in both the study group

Duration Of Performing Block (In Minutes)	Group 1	Group 2	P Value
Mean	6.7±1.32	9.45±1.76	<0.01

Table 2 shows Duration of Performing Block in the Study Subjects in both the study group. The mean duration of performing block in group 1 was 6.7±1.32 min, whereas in group 2 it was 9.45±1.76 min, On comparing there is significant difference with p value <0.01

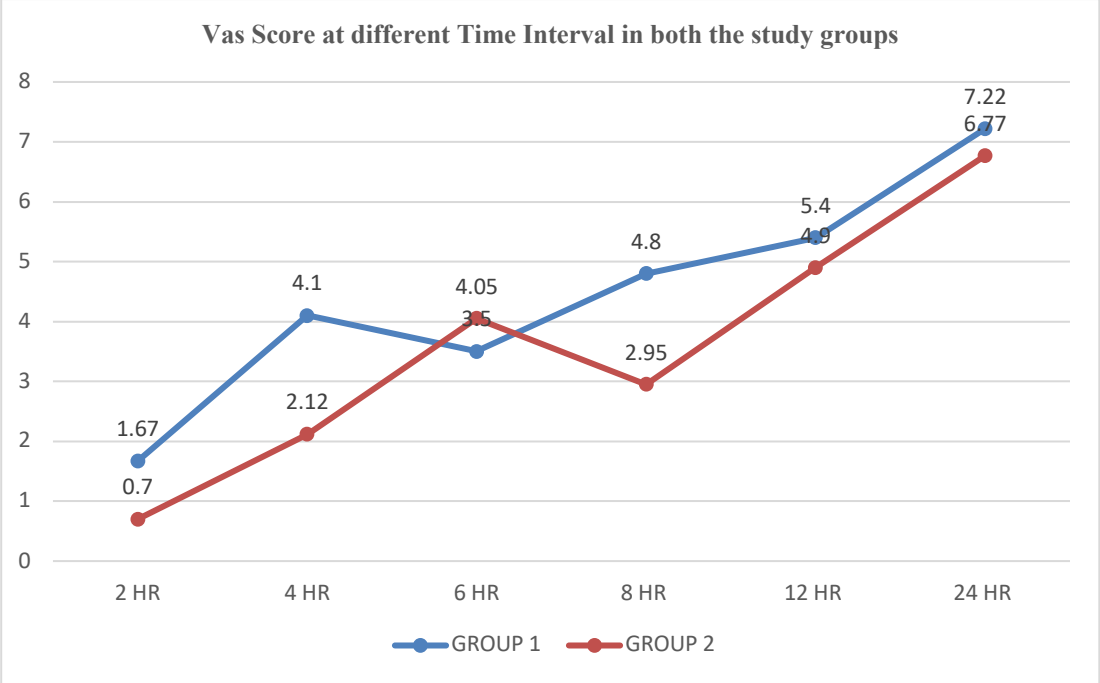


Figure 1: Vas Score at different Time Interval in both the study groups

Fig 1 shows Vas Score at different Time Interval in both the study groups, at 2 hr, the mean vas score of group 1 was 1.67, whereas in group 2 it was 0.7, at 4 hr the VAS score in grp 1 was 4.1 whereas in grp 2 it was 2.12, at 6 hr time interval the mean VAS score was 3.5 in grp 1 whereas it was 4.05 in grp 2, at 24 hr, the mean VAS score in grp 1 was 7.22, whereas in grp 2, it was 6.77

Table 3: Mean duration of performing block in both the study group

	Group 1	Group 2	P Value
Duration of performing block	6.7±1.32	9.45±1.76	**<0.01**
Number of Rescue Analgesia	3.75±0.54	3.3±0.46	**<0.01**
Time For First Rescue Analgesia	**4.55±0.90**	**5.7±0.96**	**<0.01**

Table 3 shows Mean duration of performing block in both the study group, Duration of performing block in group 1 was 6.7±1.32 min, whereas in group 2 it was 9.45±1.76 min, on comparing there is significant difference with p value <0.01, The mean number of rescue analgesia in group 1 was 3.75±0.54 min, whereas in group 2 it was 3.3±0.46 min, with significant difference between two groups. Time for first rescue analgesia in group 1 was 4.55±0.90 min, and in group 2 it was 5.7±0.96 min with significant difference with p value <0.01.

Discussion

In the subfascial block technique, the needle tip, which is insulated, avoids puncturing the thoracolumbar fascia (ATLF). Instead, local anesthetics are injected between the ATLF and the quadratus lumborum muscle. From there, the anesthetics diffuse along the ATLF to reach the endothoracic fascia and subsequently the subendothoracic space. This process leads to a lower thoracic nerve block. The ATLF is formed by the medial continuation of the transversalis fascia and the investing fascia of the psoas, and it connects with the endothoracic fascia, which in turn communicates with the lower thoracic paravertebral space. Due to this connection, the local anesthetics eventually spread along the fascia plane, affecting the lower thoracic paravertebral space, the transversalis fascia plane, and the transversus abdominis plane. As a result, the abdominal region experiences widespread blockage.

However, it's worth noting that the ATLF may act as a barrier, limiting the spread of some local anesthetics to the lumbar plexus, which reduces the possibility of a lumbar plexus block. In their trial, the subfascial approach demonstrated a reliable sensory level that mainly covered from T7-T8 to T12-L1. The pain scores at the subxiphoid and subcostal port sites were significantly lower in the subfascial group compared to the extrafascial group.

In the extrafascial block technique, the insulated needle tip is used to puncture the ATLF. Local anesthetics are then injected between the ATLF and the psoas major muscle. From this point, the anesthetics diffuse along the potential gap that exists between the ATLF and the psoas major

muscle, ultimately reaching the lumbar paravertebral region. This leads to the blockage of upper branches of the lumbar plexus.

It's worth noting that the psoas muscle, which houses the lumbosacral plexus, is commonly divided by a fascial layer between its posterior one third and anterior two thirds. As the local anesthetic spreads along the fascial and psoas muscle bundle, it can infiltrate part of the lumbar plexus. This may result in some patients experiencing weakness in their lower extremities. La Colla LA et al. [6] and Sondekoppam RV et al. [7] have reported on these observations in their respective studies.

In the present study the mean duration of surgery in group 1 was 105±8.91 min, whereas in group 2 it was 105±8.04 min, On comparing there is non-significant difference between two groups with p value 0.958. There is no statistically significant difference in the mean duration of surgery between group 1 (extrafascial approach of quadratus lumborum block) and group 2 (subfascial approach of quadratus lumborum block). The mean duration of surgery was approximately 105 minutes in both groups, and the small standard deviations (8.91 minutes in group 1 and 8.04 minutes in group 2) suggest that the data were relatively close to the mean in each group. Our results supported with Abduallah MA et al. [8] who reported that there was no a statistical significance among groups regarding duration of surgery.

The mean duration of performing block in group 1 was 6.7±1.32 min, whereas in group 2 it was 9.45±1.76 min, On comparing there is significant difference with p value <0.01. The statistically significant difference in the mean duration of performing the block may or may not have clinical significance. It is important to assess whether the observed difference is practically meaningful and has an impact on patient outcomes or procedural efficiency. The duration of performing a block can be crucial in clinical settings, as it affects the overall procedural time and patient comfort.

A quicker technique might be preferred in certain cases, while a more time-consuming approach could be justified if it leads to better outcomes or reduced complications. Abdel Wahab A. S.S. Mohammed et al [9] Duration of block was significantly longer in QLB-3 group when compared to QLB-2 group (20.1+6.2 h versus 12.0+4.8 respectively) with P value of < 0.001.

In the present study mean VAS score, at 2 hr, of group 1 was 1.67, whereas in group 2 it was 0.7, at 4 hr the VAS score in grp 1 was 4.1 whereas in grp 2 it was 2.12, at 6 hr time interval the mean VAS score was 3.5 in grp 1 whereas it was 4.05 in grp 2, at 24 hr, the mean VAS score in grp 1 was 7.22, whereas in grp 2, it was 6.77. The VAS scores at different time intervals (2 hours, 4 hours, 6 hours, and 24 hours) provide insights into the effectiveness of the two techniques in managing postoperative pain. Lower VAS scores indicate better pain relief, while higher scores suggest higher pain levels. Group 2 (subfascial approach) appears to have lower VAS scores at 2 and 4 hours compared to Group 1 (extrafascial approach). This suggests that the subfascial approach might provide more effective early postoperative pain relief. Study by Wen-quan He et al [10] The VAS pain score of the subxiphoid port site in the subfascial group were significantly less than that of the extrafascial group at the postoperative at 6 hours (2 vs. 3, P<0.001), 12 hours (2 vs. 2, P=0.001), and 24 hours (2 vs. 2, P=0.011) at rest.

Duration of performing block in group 1 was 6.7±1.32 min, whereas in group 2 it was 9.45±1.76 min, on comparing there is significant difference with p value <0.01, The mean number of rescue analgesia in group 1 was 3.75±0.54 min, whereas in group 2 it was 3.3±0.46 min, with significant difference between two groups. Time for first rescue analgesia in group 1 was 4.55±0.90 min, and in group 2 it was 5.7±0.96 min with significant difference with p value <0.01. Study by Hazem El Sayed Moawad Weheba et al [11] shows There was no notable distinction in the total amount of fentanyl used after 24 hours between the two groups of patients who required postoperative opioids. In the QLB group, 31 out of 48 patients (64.58%) did not need postoperative fentanyl, while in the TAP group, 22 out of 50 patients (44%) did not require it. The time it took for patients in the QLB group to request postoperative pain relief was significantly longer compared to those in the TAP group. Moreover, there were no significant differences between the two groups concerning postoperative nausea and vomiting (PONV), pain levels as measured by the VAS scale at 1, 6, 12, and 24 hours after surgery, duration of stay in the Post-Anesthesia Care Unit (PACU), and the amount of fentanyl administered during surgery.

Conclusions

In summary, the study concludes that the quadratus lumborum block provides longer duration of analgesia, which is evident by the time for the requirement of first analgesia. The significant reduction in total VAS score(for 24 hours) and number of rescue analgesia for QL block as compared to TAP block also suggest s that QL block afforts better quality of analgesia. Therefore, QL block can be adopted as an alternative technique for management of post-operative pain.

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