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Analgesic Efficacy of Transversalis Fascia Plane Block Versus Anterior Quadratus Lumborum Block after Caesarian Section

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ABSTRACT

Objective: To compare the post-operative analgesic efficacy of ultrasound guided transversalis fascia plane block (TFPB) with anterior quadratus lumborum block (QL) in patients undergoing caesarian section.

Study Design: Quasi-experimental study.

Place and Duration of Study: Department of Anesthesia, Combined Military Hospital Bahawalpur, Pakistan from Jan to Jun 2023.

Methodology: Blocks were done bilaterally under ultrasound guidance following the standard aseptic techniques and protocols furnished by NYSORA at the end of surgery under general anesthesia. Primary variables measured were mean total 24-hour morphine consumption and median scores on the NRS scale at 3-, 6-, 12- and 24-hours interval.

Results: Cumulative mean dose of Morphine between group TFPB and QL was 3.09±0.50 mg versus 1.69±0.67 mg (p<0.001) at 3 hours post-op, 5.71±0.75 mg versus 3.77±0.73 mg (p<0.001) 6 hours post-op, 8.66±0.63 mg versus 7.49±0.50 (p<0.001) 12 hours post-op and 9.60±0.73 mg versus 8.29±0.92 mg (p<0.001) 24 hours post-operatively. Median pain scores on the numerical rating scale (NRS) between group TFPB and QL were 3.00 (IQR=0.00) versus 2.00 (IQR=1.00) at 3 hours post-op (p<0.001), 3.00 (IQR=0.00) versus 3.00 (IQR=1.00) 6 hours post-op (p=0.043), 3.00 (IQR=0.00) versus 3.00 (IQR=0.00) (p=0.772) 12 hours post-op and 3.00 (IQR=1.00) versus 3.00 (IQR=1.00) (p=0.812) 24 hours post-operatively.

Conclusion: Anterior QL block provides better analgesia efficacy and NRS scores during the first 12 hours post-delivery with comparable Morphine consumption and NRS scores versus TFPB between 12 and 24 hours.

Keywords: Analgesia, Anterior quadratus lumborum, Caesarian, Efficacy, Transversalis fascia plane.

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INTRODUCTION

Caesarian section remains one of the most important surgical interventions being done in the obstetric setup worldwide with an estimated 21.1% of all babies delivered by the procedure in 2021.[1] With the increasing number of patients presenting to healthcare setups, anesthesia care including effective analgesia both per and post operative has become the standard care in centers of excellence globally.[2] The use of intravenous Opioids and NSAIDs have various complications for the fetus as well as the mother and their use is restricted during breastfeeding as well.[3,4] Therefore, the need for good analgesia while preventing complications from these drugs forms the mainstay of patient management.

The use of ultrasound for regional pain management has revolutionized the anesthesia practice and care when pain control is concerned.[5] The use of interfascial plane blocks for various abdominal surgeries have proven to be very effective.[6] Once administered, they are associated with very less incidence of respiratory depression, are absorbed slowly providing excellent pain control and prolonging the action of Opioids and NSAIDs given post-operatively. The standard interfascial plane block used in lower abdominal surgeries is the transversus abdominis plane (TAP) block. However, several blocks have now been developed offering better pain control resulting in excellent patient compliance, early mobilization, and early breastfeeding.

Quadratus lumborum block is one of the new block modalities being used extensively in lower abdominal surgeries.[7] Various approaches have been developed including lateral, posterior, and anterior, anterior approach being deeper in the target plane allowing for better vicinity to nearby organs for better pain relief and control but requiring more expertise to prevent adverse effects.[8]

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Compared to the QL block, the TFPB is a relatively superficial block administered with comparative ease and has also been used for lower abdominal surgeries.[9] The regional data is scarce in determining the comparative efficacy of these blocks in caesarian section surgeries and determining the preferred analgesia technique for these surgeries.

This study aims to provide comparative analgesic efficacy of both these blocks after caesarian section delivery in cases where general anesthesia must be given and spinal anesthesia is contraindicated.

METHODOLOGY

This quasi-experimental study was carried out at the Department of Anesthesiology, Combined Military Hospital Bahawalpur, Pakistan from Jan 2023-Jun 2023 after approval form the ethical review board (vide letter no.EC-04-2023) after registration of trial at https://www.irct.ir/ (trial ID; 72016) A pilot study was conducted assessing analgesic efficacy between both blocks with mean consumption of intravenous Morphine in 24 hours after surgery observed in 15 patients. The mean usage was 4.88±1.06 mg in the anterior QL block group versus 10.96±2.39 mg in the TFPB group. The sample size was then calculated keeping the confidence interval at 95%, power of test at 90%, with the mean difference of 24-hour Morphine consumption after both blocks at 6.08±1.33 mg with population variance at 100.[10] Minimum sample size according to WHO calculator came out to be 57. We included 70 patients in our study.

Inclusion Criteria: ASA-I and II female patients presenting for elective caesarian with a gestational age of more than 38 weeks to be done by Pfannenstiel incision under general anesthesia were included in the study.

Exclusion Criteria: Patients with metastatic disease, major cardiac or respiratory disease, low ejection fraction, post chemotherapy, major coagulopathy and non-consenting patients were excluded.

The study included all patients as per the inclusion criteria furnished. The patients were divided into the anterior quadratus lumborum Group (QL) (n=35) and the transversalis fascia plane Group (TFPB) (n=35) through non-probability consecutive sampling via lottery method (figure). Once the patients were divided into the two groups, an informed written consent was taken, and patients in both groups were explained in detail about the procedure and possible complications. They were informed how to interpret the standard NRS (numerical rating scale) for pain which was to be used for pain assessment post-operatively.[11] Standard monitoring including non-invasive blood pressure, heart rate, capnography and ECG was done.

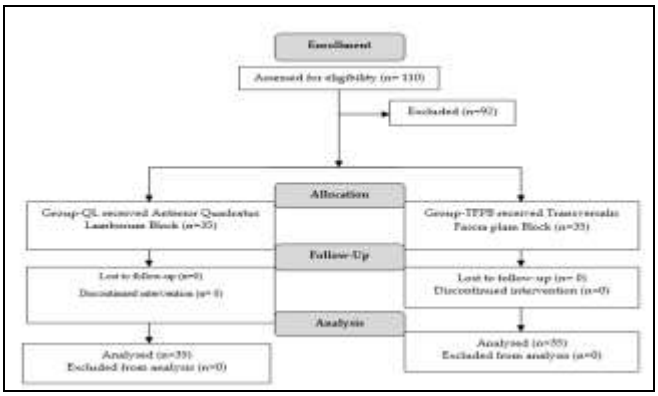

Figure: Patient Flow Diagram

Anesthesia was induced in both groups with IV Propofol 2 mg/kg, IV Atracurium 0.5 mg/kg with maintenance done with 50% oxygen with Isoflurane at 1.0 MAC. Patients were extubated after Neostigmine 0.05 mg/kg and Glycopyrrolate 0.01 mg/kg were given for reversal of the neuromuscular block. After the end of surgery before extubating, an anesthesia consultant with at least 3 years of experience performed the blocks bilaterally under ultrasound guidance following the standard aseptic techniques and protocols furnished by NYSORA for QL block and TFPB.[12,13] In the post-operative high dependency unit, the patients were observed and assessed 3-hourly on the NRS (numerical rating scale) for pain (Score of 0-10 for assessing pain, 0 for no pain and 10 being worst possible pain). Patients with a score of 3 or more were given intravenous Morphine 0.05 mg/kg and total 24-hour consumption was recorded along with median pain scores on the NRS scale.

Primary variables measured were mean total 24-hour Morphine consumption and median scores on the NRS scale at 3, 6, 12 and 24-hours interval.

Demographic data were statistically described in terms of Mean±SD, frequencies, and percentages when appropriate. Independent samples t-test was used to compare statistically significant means. Mann Whitney U test was used to compare median pain score between both groups. A *p*-value of <0.05 was considered statistically significant. All statistical calculations were performed using Statistical Package for Social Sciences 26.0.

RESULTS

A total of 70 patients were included in the study as per the study protocol divided into Group-TFPB (n=35) and Group-QL (n=35). Mean age of patients in Group-TFPB was 24.94±1.21 years versus 25.00±1.28 years in Group-QL (p=0.849). Mean weight of participants was 80.17±2.67 kg versus 79.86±2.45 years in Group-QL (p=0.610). Mean duration of surgery was 66.60±2.31 minutes in Group-TFPB versus 67.06±1.74 minutes in Group-QL (p=0.355). The time to rescue analgesia was 160.86±4.30 minutes in Group-TFPB versus 158.96±4.30 minutes in Group-QL (Table-I).

Table-I: Comparison of Baseline Variables among Groups (n=70)

Variable(s)	Group-TFPB (n=35)	Group-QL (n=35)	*p*-value
Mean Age (Years)	24.94±1.21	25.00±1.28	0.849
Mean Weight (Kg)	80.17±2.67	79.86±2.45	0.610
Mean Duration of Surgery (Min)	66.60±2.31	67.06±1.74	0.355
Time For First Rescue Analgesia (Hours)	160.86±4.30	158.96±4.30	0.508

When observing the primary variables, cumulative mean dose of morphine between Group-TFPB and Group-QL was 3.09±0.50 mg versus 1.69±0.67 mg (p<0.001) at 3 hours post-op, 5.71±0.75 mg versus 3.77±0.73 mg (p<0.001) 6 hours post-op, 8.66±0.63 mg versus 7.49±0.50 (p<0.001) 12 hours post-op and 9.60±0.73 mg versus 8.29±0.92 mg (p<0.001) 24 hours post-operatively (Table-II).

Median pain scores on the numerical rating scale (NRS) between Group-TFPB and Group-QL were 3.00 (IQR=0.00) versus 2.00 (IQR=1.00) at 3 hours post-op (p<0.001), 3.00 (IQR=0.00) versus 3.00 (IQR=1.00) 6 hours post-op (p=0.043), 3.00 (IQR=0.00) versus 3.00 (IQR=0.00) (p=0.772) 12 hours post-op and 3.00 (IQR=1.00) versus 3.00 (IQR=1.00) (p=0.812) 24 hours post-operatively (Table-II).

DISCUSSION

The findings of this study showed that anterior QL block provides better analgesia efficacy and NRS scores during the first 12 hours post-delivery with comparable morphine consumption and NRS scores versus TFPB between 12 and 24 hours.

The study was carried out at our institute to find better alternatives to intravenous analgesia techniques which restrict the early start of breastfeeding and are associated with side effects prolonging hospital stay in females after caesarian section delivery.[14] Even though several neuraxial techniques are also available for pain relief including epidural anesthesia apart from spinal, their incidence of hypotension, allergic reactions and requirement of continuous monitoring increases the hospital burden on resources.[15]

Table-II: Comparison of Cumulative Mean Morphine Consumption and Median NRS Scores (n=70)

Variable	Group-TFPB (n=35)	Group-QL (n=35)	*p*-value
Cumulative 24 Hour Mean Dose of Morphine Given (mg)			
at 3rd hour	3.09±0.50	1.69±0.67	<0.001
at 6th hour	5.71±0.75	3.77±0.73	<0.001
at 12th hour	8.66±0.63	7.49±0.50	<0.001
at 24th hour	9.60±0.73	8.29±0.92	<0.001
Median 24 hour NRS scores			
at 3rd hour	3.00 (IQR=0.00)	2.00 (IQR=1.00)	<0.001
at 6th hour	3.00 (IQR=0.00)	3.00 (IQR=1.00)	0.043
at 12th hour	3.00 (IQR=0.00)	3.00 (IQR=0.00)	0.772
at 24th hours	3.00 (IQR=1.00)	3.00 (IQR=1.00)	0.812

NRS: Numeric Rating Scale

We used intravenous morphine as the rescue analgesia technique and our study concluded better overall analgesia efficacy in the QL block group when compared with the TFPB block. This may be attributed to the deeper facial plane that is the target of the anterior quadratum lumborum block with its near vicinity to organs and deeper tissues providing better analgesia.[16] Similar studies were done by Bilgin *et al*.[17] and meta-analysis by Wang *et al*.[18] which showed lower morphine consumption in the QL block group versus TFPB. The also concluded that although the 24-hour morphine consumption was statically significant, but it wasn't clinically significant which was in line with our study. Another finding in their study was that the morphine consumption in their study was only significant after the 9 hours, but they used multimodal analgesia by adding IV acetaminophen in their study post-operatively. We aimed to use the block as a single analgesic technique, hence the difference.

When comparing the pain scores as assessed by the standard NRS (numeric rating scale), the pain scores were statistically better in the QL block group as compared to the TFPB group for the first 6 hours post-operatively. The pain scores were then statistically comparable at the 12th and 24th hour intervals which may be due to distribution of local

anesthetic on the facial planes and slow absorption through vascular channels. The improvement in NRS scores was in line with studies carried out by Serisfoy *et al*.[19] Chilkoti *et al*.[20] and Nair *et al*.[21]. They were statistically different in the first 3-4 hours and were comparable after 6 hours in all patients.

Local studies done for the same have been scarce and literature in lacking four our demographic setup for both these techniques. We hope that our study would help in providing better analgesia care with alternative regional methods presently not in vogue in our setup.

LIMITATIONS OF STUDY

The limitations are that the study is single center only. A multi-center study would result in a wider demographic area with more confirmative results. The expertise required for successfully doing the block requires more patient prep-time and experience regional block consultants not readily available in our demographic area.

RECOMMENDATIONS

The study recommends the use of bilateral QL block and TFPB block as excellent alternatives to intravenous methods of pain relief in patient after caesarian section surgery.

CONCLUSION

We conclude that anterior QL block provides better analgesia efficacy and NRS scores during the first 12 hours post-delivery with comparable morphine consumption and NRS scores versus TFPB between 12 and 24 hours.

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Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

MMS & AHB: Conception, study design, drafting the manuscript, approval of the final version to be published.

NF & NT: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.

MZA & SH: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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