

ORIGINAL RESEARCH

Quadratus lumborum block versus transversus abdominis plane block for post-operative analgesia in patients undergoing total abdominal hysterectomy under general anaesthesia

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ABSTRACT

Background: Patients undergoing lower abdominal surgeries experience postoperative pain which delays their early recovery, ambulation and lengthens the hospital stay. The abdominal blocks help in providing postoperative analgesia to a greater extent. This study aims to compare the effect of bilateral Quadratus lumborum (QL) block versus bilateral Transversus abdominis plane (TAP) block for postoperative analgesia in patients posted for total abdominal hysterectomy under general anaesthesia. **Methodology:** In this comparative prospective study sixty female patients of ASA grade 1 and 2, posted for total abdominal hysterectomy under general anaesthesia were randomized into two groups. After giving general anaesthesia, before taking the incision in Group Q (Quadratus lumborum block) or Group T (Transversus abdominis plane block) infiltration was given with 0.25% of bupivacaine 20 ml bilaterally. We compared intraoperative total usage of opioids, muscle relaxants and postoperative time for rescue analgesia in both the groups. All the patients were assessed postoperatively for severity of pain using Visual Analogue Scale (VAS) score. Time before rescue analgesia and total requirement of analgesic in the postoperative period were noted. **Results:** In comparison to group T, Group Q had lower VAS scores at each point in 24 hours. Time before rescue analgesia was much longer in Group Q (14.43 ± 2.885 versus 8 ± 2.464) when compared to group T. The total requirement of analgesic in the postoperative period was significantly lower in Group Q (35.83 ± 19.346 versus 60 ± 20.342).

Postoperative analgesia provided by QL block had a longer duration of action and required less consumption of analgesic in the postoperative period.

Keywords: Quadratus lumborum block, Transversus abdominis plane block, Total abdominal hysterectomy, Bupivacaine, General anaesthesia.

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INTRODUCTION

Total abdominal hysterectomy is considered as one of the major abdominal surgeries. Abdominal surgeries have been observed to have severe postoperative pain in comparison to other surgeries thereby lengthening hospital stay and increasing the analgesic usage in the postoperative period.^[1,2]

Pain is an unpleasant experience due to the potential tissue damage originating either from the surgical

incision or from the visceral structures, and can be aggravated by coughing or straining. Multimodal pain management methods are practiced in the current era for this purpose. We as Anaesthesiologists aim at the prevention of perioperative pain and early ambulation in major surgeries.^[3]

No individual analgesia is effective in alleviating postoperative pain and each has its own limitations. Usage of opioids, nonsteroidal anti-inflammatory

drugs (NSAIDs), infiltration by local anaesthetics, alpha-2 agonists, abdominal blocks are the multiple modalities which help in attenuating the postoperative pain. Opioids are effective analgesic to combat both somatic and visceral pain but have higher incidence of side effects such as nausea, vomiting, pruritus and respiratory depression.^[4] Regional anesthesia with epidural provides analgesia without any sedative effects, but complications such as hypotension and urinary retention should be anticipated.^[12]

QL block and TAP block are the new techniques in the domain of peripheral nerve blocks mainly practiced in order to provide postoperative analgesia.^[5] The sensory nerves which run between the abdominal muscles via the triangle of Petit are blocked by TAP block. It reduces the postoperative incisional pain and blocks lower thoracic nerve roots (T10-T12 dermatomes). QL block helps to reduce somatic pain as well as visceral pain after the major abdominal surgeries and provides analgesic coverage for 24 to 48 hours via wide local anaesthetic distribution. It provides superficial sensory and deep somatic analgesia by blocking lumbar nerve roots as well as nerves within the transversus abdominis plane (T7-L1 dermatomes). Some authors advice for catheter in situ for continuous local anaesthetic infusion to cover for a longer duration of postoperative analgesia.^[10]

The extensive spread of local anaesthetics in QL block is due to the paravertebral space or the thoracolumbar plane which contains the mechanoreceptors and the sympathetic fibres.^[7] In our study we have compared the efficacy of these two blocks for its total duration of postoperative analgesia and the reduction of opioid usage in the intraoperative period.

Several studies have been done in the past comparing the effects of QL block and TAP block for postoperative analgesia but the results were inconsistent. The aim of our study is to compare the effect of bilateral QL block versus bilateral TAP in patients posted for total abdominal hysterectomy under general anaesthesia and evaluate the duration of postoperative analgesia and the need for rescue analgesia in first 24 hours.

METHODS

This study was conducted in the Department of Anaesthesiology, B.L.D.E (Deemed to be university), Shri B. M. Patil Medical College, Hospital and Research Centre, Vijayapura from January 2021 to June 2022. Institutional ethical committee approval (IEC/No-09/2021) and Clinical Trial Registry of India (CTRI) number is CTRI/2021/08/035571. Patients between the age group of 30 to 60 years, with ASA grade I and II were included in the study. Patients with local infection at the site,

coagulopathies, allergies were excluded.

The sample size is 30 per group (i.e a total of 60 cases) to achieve a power of > 99% and a level of significance of 1% (two sided), for detecting a true difference in means between two groups. Sixty participants were randomly divided into two groups (Group Q=30; Group T=30) allocated as per the computer-generated random tables to receive 20 ml of 0.25% bupivacaine. Block randomization was followed.

$$N = \frac{2[(Z_{\alpha} + Z_{\beta}) * S^2]}{d}$$

Before taking the patient for surgery, detailed history, general and systemic examination was carried out the previous day. History of any significant medical illness was taken and airway, respiratory system, cardiovascular system were assessed. After explaining nil per oral status, written informed consent was taken and required investigations were collected.

On the day of surgery, after confirming the nil per oral status, patient was shifted to operation theatre. Standard monitoring devices like non-invasive blood pressure, pulse oximetry, ECG were attached and basal values were recorded. After securing IV line with 18/20 G cannula and Intravenous fluid was started. Patients were premedicated with injection midazolam (0.08 mg/kg), injection glycopyrrolate (0.01 mg/kg), injection ondansetron (0.1 mg/kg) and injection fentanyl (2 µg/kg). Pre-oxygenation was done with 100% oxygen for 3-5 minutes. Induction was done with injection Propofol (2 mg/kg) and injection atracurium (0.8 mg/kg) was used for muscle relaxation. Patient was intubated with the appropriate size ET tube. Anaesthesia was maintained with oxygen (O₂) 50%, nitrous oxide (N₂O) 50% and isoflurane 0.8% with intermittent bolus doses of atracurium (0.5 mg/kg). Before taking the surgical incision, anaesthesiologist performed bilateral respective abdominal block.

For the TAP block, double POP technique was used. From the anterior superior iliac spine, a mark was taken 5cms towards the cranial side. From this point 5cms posteriorly at the anterior axillary line, a 22G needle was pierced. After experiencing double POP and confirmation of negative aspiration, 0.25% of bupivacaine 20 ml was deposited bilaterally in the neuro fascial plane between the two abdominal muscles, namely, internal oblique and transversus abdominis. The target dermatomes were lower six thoracic and upper lumbar nerves (T6-L1) as they transverse through the plane before emerging to the abdominal wall. Similar technique with the needle directing caudal and posteriorly, 0.25% of bupivacaine 20 ml was deposited for the QL block. The important landmarks for the blind blocks are depicted in Figure 2.

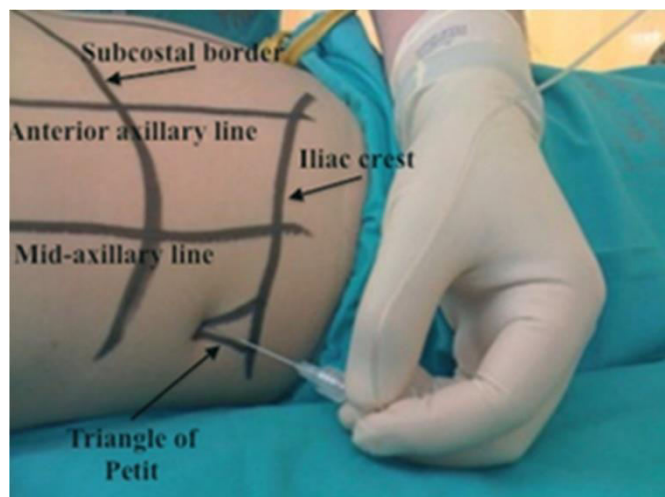


FIGURE 2- Landmark technique

Intraoperatively, the total usage of opioids and muscle relaxants were noted. Patients were reversed with injection neostigmine (0.05 mg/kg) and injection glycopyrrolate (0.01 mg/kg) and smooth extubation was carried out. Postoperatively the time for rescue analgesia was noted and VAS scores were monitored for 24 hours. If VAS score was >3, then intravenous bolus dose of Injection Diclofenac 75 mg was given as rescue analgesic.

The data was recorded in a Microsoft Excel sheet and statistical analysis was done using statistical package for the social sciences (Version 20). Results were presented as Mean ± SD, percentages and bar graphs. Independent t test was used for the normally distributed continuous variables. Mann Whitney U

test was used for the non-normally distributed variables. Chi-square test was used for the categorical variables. P value <0.05 was considered statistically significant.

RESULTS

All the sixty patients who were enrolled in this prospective comparative study completed the analysis. Consolidated Standards of Reporting Trials (CONSORT) diagram depicting patient enrolment, randomization, allocation and analysis is shown in the Figure 1. The demographic data such as age and weight were statistically insignificant as P value is <0.05 and are depicted in the Table 1.

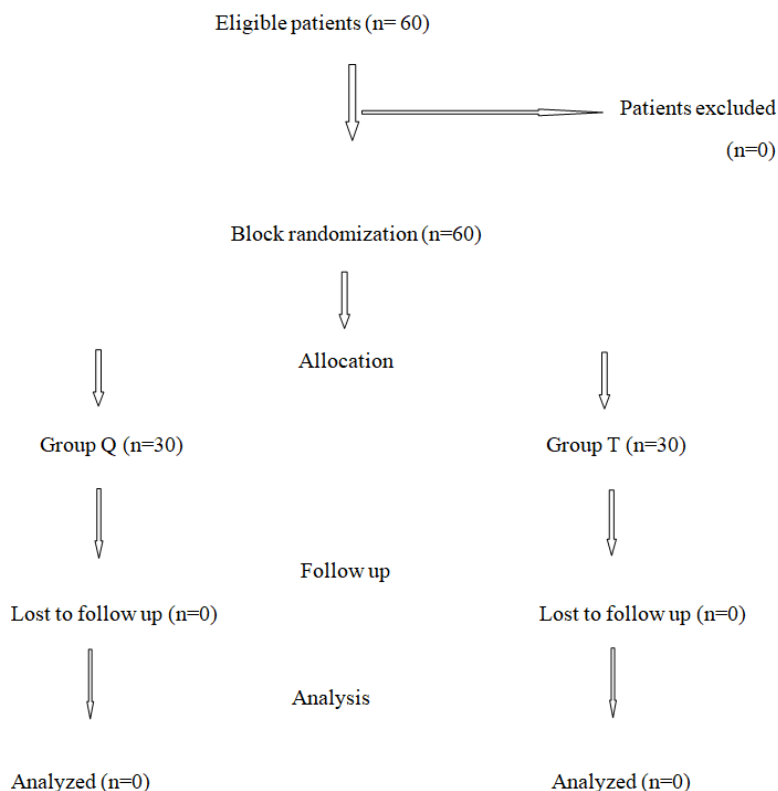


Figure 1- Consolidated Standards of Reporting Trials (CONSORT) diagram

Table 1 : Distribution of Age and Weight

Parameters	TAP BLOCK		QL BLOCK		Mann-Whitney test	p-value
	Mean	Standard Deviation	Mean	Standard Deviation		
Age(years)	43.07	6.533	41.47	4.305	(Student t test) t=1.120	0.267
Weight(kgs)	59.13	6.715	60.97	6.510	U=385.000	0.335

TAP- Transversus abdominis plane; QL- Quadratus Lumborum

As shown in Table 3, Group Q (83.3%) had longer postoperative analgesia than Group T (20%) in terms of the percentage of patients who did not require analgesia, which was statistically significant ($p < 0.0001$). The time before rescue analgesia (hours) was significantly longer with Group Q (14.43 ± 2.885), as compared to Group T (8 ± 2.464). The total requirement of analgesic in the intraoperative period was significantly less in Group Q (59.17 ± 18.712) as compared to Group T (96.67 ± 22.489). Similarly,

Group Q (32 ± 6.513) had a lower overall requirement for muscle relaxants during the intraoperative period than Group T (47.33 ± 7.397) which was statistically significant ($p < 0.000$). When compared to Group T (60 ± 20.342), Group Q (35.83 ± 19.346) had a lower total postoperative analgesic demand, which was statistically significant with a P value of 0.000. All these variables proving the efficacy of QL block are depicted in Table 2.

TABLE 2- Distribution of Intraoperative and Postoperative Values

PARAMETERS	TAP BLOCK		QL BLOCK		Mann-Whitney test	p-value
	Mean	Standard Deviation	Mean	Standard Deviation		
TIME BEFORE RESCUE ANALGESIA(HOURS)	8.00	2.464	14.43	2.885	44.500	0.000
TOTAL REQUIREMENT OF ANALGESICS IN OPERATIVE PERIOD (FENTANYL in mcg)	96.67	22.489	59.17	18.712	102.500	0.000
TOTAL REQUIREMENT OF MUSCLE RELAXANT IN OPERATIVE PERIOD (ATRACURIUM in mg)	47.33	7.397	32.00	6.513	65.500	0.000
TOTAL REQUIREMENT OF ANALGESICS IN POST OPERATIVE PERIOD (Diclofenac in mg)	60.00	20.342	35.83	19.346	198.000	0.000

TAP- Transversus abdominis plane; QL- Quadratus Lumborum

TABLE 3- Distribution of Number of patients who did not need analgesia

NUMBER OF PATIENTS WHO DID NOT NEED ANALGESIA POST OPERATIVELY (%)	TAP BLOCK		QL BLOCK		Chi square test	p value
	Number of patients	%	Number of patients	%		
YES	24	80.0	5	16.7	24.093	$p < 0.0001$
NO	6	20.0	25	83.3		
Total	30	100.0	30	100		

TAP- Transversus abdominis plane; QL- Quadratus Lumborum

In the postoperative period, Visual analogue score at 5 minutes, 10 minutes, 15 minutes were comparable between both the groups and were statistically insignificant. Whereas at 20 minutes, 25 minutes, 30 minutes, 2 hours, 6 hours, 12 hours and 24 hours

better postoperative analgesia was experienced in Group Q as compared to Group T which was statistically significant. Visual analogue score (VAS) evaluation and bar graph of values throughout the course of 24 hours are shown in Figure 3.

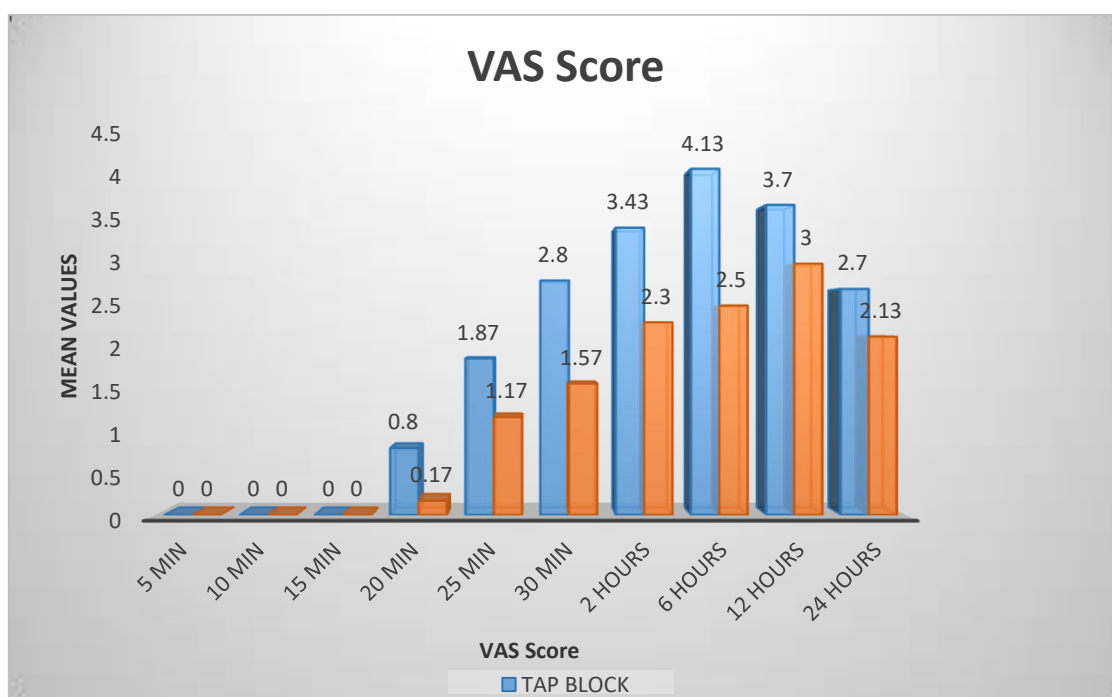


FIGURE 3-Comparison of Visual analogue score (VAS)

DISCUSSION

Abdominal surgeries are usually accompanied by severe postoperative pain and various techniques have been tried to improve postoperative pain. Abdominal nerve blocks have been introduced to help in decreasing the amount of intraoperative drug usage and comforting the patient postoperatively, thus attenuating the side effects of opioids. The drug potency is dependent on the property of local anaesthetic used, type of abdominal block, vascularity of the site, addition of epinephrine and lipid solubility of the drug. This results in longer local anaesthetic exposure to the nerves and less systemic absorption. Bupivacaine is a lipophilic agent used in our study which prolongs the duration of action and thus helps in longer postoperative analgesia.^[11]

In a similar study conducted by OKSUZ et al, TAP block and QL block were performed for postoperative analgesia among the paediatric patients undergoing abdominal surgeries. They observed that QL block provided longer duration of analgesia (900 minutes)

than that of TAP block (600 minutes).^[6] This is comparative to our study where QL block provided longer duration of postoperative analgesia (14.43 ± 2.885 hours) as compared to TAP block (8 ± 2.464 hours).

According to the study done by Blanco et al, TAP block and QL block were performed on patients undergoing caesarean section for postoperative analgesia. They concluded that postoperative opioid consumption was significantly less in QL block group.^[7] Similarly, in our study the postoperative requirement of analgesic was significantly less in the QL block (35.83 ± 19.346) as compared to TAP block (60 ± 20.342).

The study conducted by YOUSEF et al had similar results as of ours where in the group receiving QL block, there was significant less consumption of fentanyl and morphine as compared to the TAP block group. VAS scores were also observed to be higher in TAP block group at all times than in QL block group whereas postoperative analgesia was longer in QL

block group and the number of patients requesting postoperative analgesia were significantly higher in TAP block group.^[8]

Ahmed M et al conducted a study, wherein patients undergoing inguinal hernia repair surgery were included and comparison was done between the TAP block and local infiltration of the wound. TAP block group had 489+/-93.2 minutes of duration of analgesia and showed better results compared to the other group.^[9] In our study we have an advantage of comparing two abdominal blocks and it was observed that QL block had significantly longer duration of postoperative analgesia when compared to TAP block, hence proving the efficacy of one block over the other.

QL block comes with a lot of practice and experienced hands, but the postoperative analgesia is longer compared to any other modalities. On the other hand, TAP block can be easily learnt and performed but the duration of analgesia may not be promising. The only theoretical disadvantage is the occurrence of paravertebral haematomas and infections in case of damage to the vessels traversing paravertebral space in case of QL block. Our study proved the efficacy of QL block over TAP block by its extensive dermatomal spread and by lessening the usage of opioids and its side effects.

Our study is limited to Total abdominal hysterectomy cases, so its results may vary in other types of abdominal surgeries and may not be accurate. As all patients received general anaesthesia, the results may not be the same with regional anaesthesia techniques.

CONCLUSION

Our study concluded that QL block produced prolonged postoperative analgesia and greatly reduced the need of analgesics in the postoperative period as compared to the TAP block. It is more efficacious in terms of less consumption of intraoperative analgesic as well as muscle relaxant and the duration for rescue analgesia in 24 hours.

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Conflicts of interest: There are no conflicts of interest.

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