

## EFFICACY OF TRANSMUSCULAR QUADRATUS LUMBORUM BLOCK IN THE MULTIMODAL REGIMEN FOR POSTOPERATIVE ANALGESIA AFTER TOTAL LAPAROSCOPIC HYSTERECTOMY: A PROSPECTIVE RANDOMISED DOUBLE-BLINDED STUDY

Nazar PA<sup>1</sup>, Azeem Davul<sup>2</sup>

<sup>1</sup>Associate Professor, Department of Anaesthesiology, KMCT Medical College, Mukkam, Kozhikode, Kerala, India.

<sup>2</sup>Associate Professor, Department of Anaesthesiology, KMCT Medical college, Manassery, Kozhikode, Kerala, India.

Received : 05/11/2022  
Received in revised form : 12/12/2022  
Accepted : 23/12/2022

**Keywords:**  
Laparoscopic Hysterectomy,  
Ropivacaine, TQLB, postoperative  
analgesia.

Corresponding Author:  
**Dr. Azeem Davul,**  
Email: davulazeem@gmail.com  
ORCID: 0000-0002-0274-1043

DOI: 10.47009/jamp.2023.5.1.67

Source of Support: Nil,  
Conflict of Interest: None declared

*Int J Acad Med Pharm*  
2023; 5 (1); 324-327



### Abstract

**Background:** The population of patients scheduled for total laparoscopic hysterectomy at our surgical center is heterogeneous concerning a multitude of demographic variables such as age, collateral surgery and malign or benign pathogenesis. A common denominator is moderate to severe postoperative pain and a substantial opioid consumption. A recent procedure specific postoperative pain management (PROSPECT) review found no gain from the regional techniques included. **Materials and Methods:** The subjects were randomly allocated into Group-Q (to receive block with local anaesthetic) and Group-C (control, to receive block with saline) using a computer-generated sequence of random numbers. The group sequence was concealed in sealed opaque envelopes, which were opened only after obtaining informed consent. Two syringes of 20 ml containing either 40 ml saline or 40 ml 0.375% ropivacaine were prepared by an anaesthesiologist who was not involved in the study. The anaesthesiologist, the subjects and the post-operative care providers were blinded to the group assignment. **Result:** A total of 148 patients (70 in Group-C and 68 in the Group-Q) were enrolled into the study. Two patients in the Group-C were excluded (due to violation of protocol). In Group-Q three patients were excluded (two because of violation of protocol and, one because of inability to localize the correct plane for injection). Totally 69 patients (n=70 Group-C & n=68 Group-Q) were analysed. The demographic variables, intraoperative vital parameters, duration of surgery and intraoperative fentanyl consumptions were comparable in both the groups [Table 1]. The mean (SD) time to first analgesic request was 7.8 (1.5) hours in Group-Q and 3.2 (1.0) hours in Group-C, 95% CI (3.9 -5.1) (P < 0.0001) [Table 2]. **Conclusion:** Ultrasound-guided TQLB with the local anaesthetic ropivacaine prolongs the first request to analgesia, provides effective postoperative analgesia during rest as well as on movement after TLH and reduces fentanyl use compared to saline. We suggest further studies to evaluate the effect of TQLB on chronic pain and the safety profile of TQLB.

## INTRODUCTION

The population of patients scheduled for total laparoscopic hysterectomy at our surgical center is heterogeneous concerning a multitude of demographic variables such as age, collateral surgery and malign or benign pathogenesis.<sup>[1]</sup> A common denominator is moderate to severe postoperative pain and a substantial opioid consumption. A recent procedure specific postoperative pain management (PROSPECT)

review found no gain from the regional techniques included.<sup>[2]</sup> The transmuscular quadratus lumborum (TQL) block has shown promising results in recent trials for other types of surgery. The aim of the current study was to investigate the analgesic efficacy of the ultrasound-guided TQL block for total laparoscopic hysterectomy.<sup>[3]</sup>

Multimodal pain management program is needed to control severe pain after abdominal hysterectomy which is considered as one of the major abdominal surgeries. Opioids (which are the analgesic of

choice) have many adverse effects such as sedation, nausea, and vomiting. Hence, different methods are needed to control pain and decrease opioid consumption and its side effects.<sup>[4]</sup> Transversus abdominis plane (TAP) block blocks the sensory afferent nerves run between the abdominal muscles and controls postoperative incisional pain. Blanco was the first who described the quadratus lumborum block (QLB). Somatic pain after upper and lower abdominal surgery can be controlled by QLB.<sup>[5]</sup> QLB can be performed for all generations (adult, pediatrics, and pregnant). QLB is considered to be an easy technique to learn as it is easy to get the key sonoanatomic markers for QLB. The novice can learn this block after only a few performance of the procedure. QLB produces effective postoperative analgesia after abdominal surgery, laparoscopic surgery, anterior abdominal wall surgery, and hip and femur surgery.<sup>[6]</sup>

The primary objective was to evaluate the duration of pain relief after TQLB and the secondary objectives were to compare the amount of fentanyl consumption, the pain scores, the post-operative nausea vomiting (PONV) and the block related complications in the TQLB group compared to the control group.

## MATERIALS AND METHODS

**Study design:** A Prospective Randomised Double-Blinded Study

**Study Location:** KMCT Medical college  
Manassery, Kozhikode

**Study duration:** January 2022 to December 2022 (year).

**Sample size:** 148 patients

### Inclusion criteria

A total of 148 female patients aged between 30-60 years with American Society of Anesthesiologists (ASA) physical status class 1 or 2 planned for non-emergency TLH under GA and given the informed consent were included in this study.

### Exclusion criteria

Patients with history of allergy to local anaesthetic drugs, having contraindications to regional anaesthesia (bleeding disorder, peripheral neuropathy and infection at the site of block), uncontrolled diabetes, hypertension or cardio-respiratory disease were excluded.

The subjects were randomly allocated into Group-Q (to receive block with local anaesthetic) and Group-C (control, to receive block with saline) using a computer-generated sequence of random numbers. The group sequence was concealed in sealed opaque envelopes, which were opened only after obtaining informed consent. Two syringes of 20 ml containing either 40 ml saline or 40 ml 0.375% ropivacaine were prepared by an anaesthesiologist who was not involved in the study. The anaesthesiologist, the

subjects and the post-operative care providers were blinded to the group assignment. As per hospital practice, injection metoclopramide (10 mg) and ranitidine (50 mg) were given intravenously 1 hr before surgery. In the operation room, vascular access was secured using an 18-gauge intravenous cannula and prophylactic antibiotic was given as per hospital protocol. Standard non-invasive monitors like electrocardiograph (ECG), non-invasive blood pressure (NIBP) monitor, and pulse oximeter were connected and base line values were recorded. Anaesthesia was induced by IV injection of 2-3 mg/kg propofol, 2 µg/kg fentanyl, and vecuronium 0.1 mg/kg body weight as muscle relaxant. Following endotracheal intubation, general anaesthesia was maintained with a mixture of oxygen and nitrous oxide (40:60) and isoflurane (1% end-tidal concentration), maintaining an end-tidal carbon dioxide level of 35–40 mm Hg. The isoflurane concentration was adjusted to maintain blood pressure and heart rate values within 20% of the preoperative measurements IV bolus of fentanyl (0.5–1 µg/kg) was used for analgesia as necessary. After the surgery, US-guided TQLB was given by one of the expert anaesthetists (AJ/NS/SC) who had >4 years of experience in US-guided regional anaesthesia. After the block, patients were extubated after adequate recovery of consciousness and spontaneous respiration. All the subjects received 75 mg diclofenac IV during skin closure and then at 12 hourly intervals.

Statistical analysis: Statistical analysis was done using MedCalc® version 19.2.1 (USA). Intra-operative characteristics were assessed using the student's t-test (two tailed, unequal variances) and Chi square test as appropriate. Continuous data was assessed for normality using the "Kolmogorov-Smirnov test" of normality.

## RESULTS

A total of 148 patients (70 in Group-C and 68 in the Group-Q) were enrolled into the study. Two patients in the Group-C were excluded (due to violation of protocol). In Group-Q three patients were excluded (two because of violation of protocol and, one because of inability to localize the correct plane for injection). Totally 69 patients (n=70 Group-C & n=68 Group-Q) were analysed. The demographic variables, intraoperative vital parameters, duration of surgery and intraoperative fentanyl consumptions were comparable in both the groups [Table 1]. The mean (SD) time to first analgesic request was 7.8 (1.5) hours in Group-Q and 3.2 (1.0) hours in Group-C, 95% CI (3.9 -5.1) (P < 0.0001) [Table 2]. The mean (SD) dose of fentanyl used in 24 hours was 167.3 (44.0) µg in Group-Q and 226.5 (41.9) µg in Group-C, 95% CI [38.5- 79.8] (P < 0.0001) [Table 2]. At all points during the study, pain scores both at rest and on movement were significantly lower in the Group-Q compared to the Group-C [p <

0.0001, Table 3]. There was no difference with respect to nausea scores, sedation and pruritus between the two groups [Table 4]. None of the subjects needed naloxone. No patient had any local

anaesthetic or block related complication during the block or muscle weakness in the postoperative period.

**Table 1: Demographic Characteristics of Patients, Duration of Surgery and Intraoperative Fentanyl Used in Group C and Group Q**

Parameters	Group-Q (n=68)	Group-C (n=70)	P Value
Age (years)	43.5(7.9)	43.5 (4.4)	0.989
Weight (kg)	61.3 (7.5)	63.2 (8.2)	0.302
Height (cm)	150.8(4.9)	151.6(5.7)	0.505
ASA (I/II)	12/56	16/54	0.765
Heart rate (mean, SD)	77.5(8.3)	81.2(7.5)	0.053
MAP (mm hg)	74.5(6.5)	75.6(7.4)	0.52
Spo2 (%)	99.6(0.6)	99.6(0.7)	0.836
Duration of surgery (min)	153(38)	150(42)	0.756
Intra-operative fentanyl used Mean (SD) µg	124.8(29.2)	125.9(27.6)	0.873

**Table 2: Time to First Analgesic Request and The Dose of Fentanyl Used in 24 h in Group Q and Group C**

Parameters	Group-Q (n=68)	Group-C (n=70)	95% CI	P value
Time to first analgesic request, mean (SD) hours	7.8 (1.5)	3.2 (1.0)	3.9-5.1	0.0001
Fentanyl used in 24 h, mean (SD) µg	167.3(44.0)	226.5 (41.9)	38.5-79.8	0.001

**Table 3: Comparative VAS score during rest and movement in Group Q and Group C at various time points from 2 h-24 h**

Parameter	Group Q (N=68)	Group C (N=70)	P value
VAS Score at rest			0.001
2h	2(1.5)	6(2,5)	0.001
4h	2(0.1)	6(2,4)	0.001
6h	2(1,2)	4(1.5,5)	0.001
12h	2(1,2)	4(2,3)	0.001
18h	2(1,2)	5(2,3)	0.001
24h	2(1,2)	4(1,2.5)	0.001
VAS Score on movement			
2h	2(0.1)	8(3,6)	0.001
4h	4(1,2)	9(3,6)	0.001
6h	4(2,3)	6(2,7)	0.001
12h	4(2,2)	8(3,5)	0.001
18h	4(1.25, 2)	6(2.5, 4)	0.001
24h	4 (1,2)	6 (2, 3.5)	0.001

**Table 4: Incidence of Post Operative Nausea and Vomiting, Sedation, and Pruritus in Group Q and Group C**

Parameter	Group Q (N=68)	Group C (N=70)
Nausea and vomiting score		
Absent	52	40
Mild	10	12
Moderate	4	14
Severe	2	4
Level of sedation (Score)		
Fully awake	50	40
Respond to verbal	14	22
Respond to touch	4	8
Respond to pain	0	0
Pruritus		
Present	2	4
Absent	66	66

## DISCUSSION

In this study we observed that TQLB provided effective pain relief compared to control group. Patients in the Group-Q had significantly prolonged time to first request to analgesia, reduced fentanyl requirement in 24 hours and lower VAS scores compared to Group-C.

Severe postoperative pain after TLH often requires aggressive management to avoid unnecessary suffering and delay in the discharge from the hospital. MMA is the standard practice and the recent PROSPECT recommendations also suggest to use MMA to minimise the opioid use and its adverse effects. Currently, truncal blocks became an important component of MMA. Initially, transversus abdominis plane (TAP) block was used for analgesia

in TLH however, due limited extent of blockade and lack of visceral analgesia, their role in providing analgesia in TLH is debatable.<sup>[7]</sup>

In recent times, the QLB which is an evolution of the TAP block has been found to be superior than TAP block. The exact mechanism of QLB is poorly understood, however the spread of local anaesthetic (LA) into the paravertebral space and the effect on sympathetic fibres are probable reasons for superior analgesia.<sup>[8]</sup>

There are many approaches of QLB and each approach has the variable spread of LA and variable clinical effects. One recent study has also suggested that posterior QLB significantly reduces postoperative pain following laparoscopic gynaecological surgery. However, the clinical studies evaluating the efficacy of TQLB for postoperative analgesia in TLH are lacking. Therefore, we conducted this study to evaluate the analgesic efficacy of TQLB in TLH surgery.<sup>[9]</sup>

To summarise our findings, the TQLB is a novel technique which can be used as an adjunct to multimodal analgesia for TLH. Group-Q patients had prolonged and better pain relief and required less fentanyl over 24 hours than patients of Group-C. Although, the calculated effect size (Hedges' g) was large enough for two important parameters to prove superiority of TQLB analgesia in TLH (3.47 for first request for analgesia and 1.37 for fentanyl used in 24 hours). However, before generalising the results and assuming its superiority on previously existing blocks used for pain relief in TLH, a comparative study with large participants is warranted.<sup>[10]</sup>

## CONCLUSION

Ultrasound-guided TQLB with the local anaesthetic ropivacaine prolongs the first request to analgesia,

provides effective postoperative analgesia during rest as well as on movement after TLH and reduces fentanyl use compared to saline. We suggest further studies to evaluate the effect of TQLB on chronic pain and the safety profile of TQLB.

## REFERENCES

1. Stanley G, Appadu B, Mead M, Rowbotham DJ. Dose requirements, efficacy and side effects of morphine and pethidine delivered by patient-controlled analgesia after gynaecological surgery. *Br J Anaesth.* 1996;76:484-6.
2. Woodhouse A, Mather LE. The effect of duration of dose delivery with patient-controlled analgesia on the incidence of nausea and vomiting after hysterectomy. *Br J Clin Pharmacol.* 1998;45:57-62.
3. Ng A, Swami A, Smith G, Davidson AC, Emembolu J. The analgesic effects of intraperitoneal and incisional bupivacaine with epinephrine after total abdominal hysterectomy. *Anesth Analg.* 2002;95:158-62.
4. McDonnell JG, O'Donnell B, Curley G, Heffernan A, Power C, Laffey JG. The analgesic efficacy of transversus abdominis plane block after abdominal surgery: A prospective randomized controlled trial. *Anesth Analg.* 2007;104:193-7.
5. Blanco R. TAP block under ultrasound guidance: The description of a 'non pops technique' *Reg Anesth Pain Med.* 2007;32:130.
6. Kadam VR. Ultrasound-guided quadratus lumborum block as a postoperative analgesic technique for laparotomy. *J Anaesthesiol Clin Pharmacol.* 2013;29:550-2.
7. Blanco R, Ansari T, Girgis E. Quadratus lumborum block for postoperative pain after caesarean section: A randomised controlled trial. *Eur J Anaesthesiol.* 2015;32:812-8.
8. Chakraborty A, Goswami J, Patro V. Ultrasound-guided continuous quadratus lumborum block for postoperative analgesia in a pediatric patient. *A A Case Rep.* 2015;4:34-6.
9. Akerman M, Pejčić N, Veličković I. A review of the quadratus lumborum block and ERAS. *Front Med (Lausanne)* 2018;5:44.
10. Agarwal RR, Wallace AM, Madison SJ, Morgan AC, Mascha EJ, Ilfeld BM, et al. Single-injection thoracic paravertebral block and postoperative analgesia after mastectomy: A retrospective cohort study. *J Clin Anesth.* 2015;27:371-4.