

Comparative Efficacy of Ultrasound-Guided Quadratus Lumborum Block Versus Transversus Abdominis Plane Block for Postoperative Analgesia Following Total Abdominal Hysterectomy

Anshuman Tripathy¹, Diptimayee Sahu², Alok Kumar Sahoo³, Basanta Kumar Pradhan⁴

¹Assistant Professor, Department of Radiodiagnosis, AHPGIC, Cuttack, Odisha, India

²Associate Prof, Department of Obstetrics and Gynaecology, DREAMS Institute of Health Sciences & Hospital, Tangi, Cuttack, Odisha, India

³Assistant Professor, Department of Anaesthesiology, SCB Medical College, Cuttack, Odisha, India

⁴Professor, Department of Anaesthesiology, Kalinga Institute of Medical Sciences (KIMS), Bhubaneswar, Odisha, India

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Corresponding author: Dr. Alok Kumar Sahoo

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Abstract

Aim: Total abdominal hysterectomy (TAH) is the most common surgery performed in women which can result in remarkable postoperative pain. The aim of the present study was to compare the effectiveness of ultrasound-Guided quadratus lumborum block (QLB) with the transversus abdominis plane (TAP) block for postoperative pain in total abdominal hysterectomy.

Methods: This study was done in 70 patients posted for abdominal hysterectomy who were divided into two groups of 35 each. QLB was given bilaterally in group Q with 40 ml of 0.375% ropivacaine and TAP block was given in group T with 40 ml of 0.375% ropivacaine. Time required for first analgesic demand was primary aim. Secondary aim was total rescue analgesia (paracetamol) required in 24 hrs, pain scores, nausea, vomiting, sedation and any other complications.

Results: The time required for first analgesic demand was 5.4 ± 1.7 hrs in T group and 10.2 ± 1.1 hrs in group Q which was statistically significant. The total paracetamol consumption in 24 hours was 1.8 ± 0.4 gm in group Q and 3.2 ± 0.7 gm in group T, difference being significant.

Conclusion: In patients undergoing abdominal hysterectomy quadratus lumborum block may be preferred over TAP block for post-operative analgesia. It not only improves the visual analogue scale (VAS) score but also decreases the rescue analgesic consumption without any complications.

Keywords: Quadratus Lumborum Block, Postoperative, Analgesia, Transverse Abdominis Plane Block.

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Introduction

Abdominal blocks like transverse abdominal plane (TAP) block and transmuscular quadratus lumborum block (QLB) are commonly used for postoperative analgesia.[1] Earlier trials on TAP blocks have not shown any positive results as it only blocks somatic pains, without blocking visceral pain as local anesthetics fails to spread to the paravertebral space.

Local anesthetics block the nerves transmitting visceral pain in the thoracic paravertebral space which includes T4–L1 dermatomes.

In QLB, local anesthetics spread between the psoas major and the quadratus lumborum to the fascial interspace posterior to the transverse

fascia.[2] Kadam et al [3] concluded that QLB could provide better postoperative analgesia compared to TAP block. In few cadaveric trials of the QLB, dye was seen spreading in the paravertebral space which surrounds the somatic nerves, and the thoracic sympathetic trunk.[4]

Deng et al [5] compared the duration of analgesia provided by the QLB and TAP block in his study on patients undergoing colorectal surgery. He has shown a significant difference between the duration of analgesia provided by the QLB as compared to the TAP block. We have tried to validate the efficacy of these two blocks further.

Therefore, we have done a prospective randomized controlled trial to compare the analgesic efficacy of QLB with TAP block. The primary outcome was the duration of analgesia after QLB as compared to TAP block determined by the time to first rescue analgesia. Secondary outcomes were total analgesic consumption and visual analogue scale (VAS) score.

Methods

This is a prospective randomised double blind trial which was undertaken after approval from our Institutional ethics committee. Informed consent was obtained from all patients. A total of 70 patients aged between 30 to 70 years with ASA (I/II) posted for abdominal hysterectomy under general anaesthesia were included in our study. Patients having history of allergy to local anaesthetics, coagulopathy, chronic renal failure, BMI >25kg/m², block site infection and cardiorespiratory diseases were excluded. All the patients were randomly split sequentially into group Q and group T using a computer-generated random numbers. The allocated sequence was put in sealed opaque envelopes and were opened in the operation theatre. Group Q received ropivacaine in QLB and group T received ropivacaine with TAP block. The anaesthesiologist who recorded pain characteristics were blinded to the group allocation and blocks.

In the operation theatre, IV access was established using an 18-gauge IV cannula and ringers lactate was started. Electrocardiograph (ECG), non-invasive blood pressure (NIBP) monitor, and pulse oximeter were attached and base line data were recorded. Ultrasound (US) guided QLB was given as described by Jodan.[6] IV midazolam 0.03mg/kg and fentanyl 1mcg/kg was administered. Then all patients were put in the left and right lateral decubitus position and block was given.

A low-frequency 18–6 MHz curvilinear ultrasound transducer was put just above the anterior and posterior iliac crest and below the rib cage. Structures like the transverse process, vertebral body, erector spinae muscle, quadratus lumborum muscle, and the psoas muscle making up the “shamrock” sign was identified.[6] Tip of the needle was directed between the psoas muscle and the quadratus lumborum muscle and 20 ml of either of 0.375% ropivacaine was injected into the interfascial plane on each side. In group T patients, a TAP block was performed in the supine position by placing a linear US probe (10-15 MHz) in a transverse plane between the lower costal margin

and the iliac crest. After identification of transversus abdominis muscle below external oblique and internal oblique muscles, 2 mL of normal saline was injected for the confirmation of appropriate space, and then 20 mL of 0.375% ropivacaine was deposited in the plane on either side with intermittent aspiration. All the patients were tested for successful block and patients with successful block were allowed for surgery after administering general anaesthesia as per institutional protocol. The pain was measured by the Visual Analogue Score (VAS) [7] on the scale of 0-10 (0 - no pain and 10 - worst imaginable pain). Complications like pruritus, sedation, nausea, and haemodynamic abnormalities were assessed in both the groups at 20min, 40min, 1hrs, 3hrs, 6hrs, 9hrs, 12hrs, 15hrs, 18hrs, 21hrs and 24 hours after the surgery. Rescue analgesia (iv paracetamol 15mg/kg) was given when VAS score >4. Primary outcome was the time required for first analgesic request. Secondary outcome was total dose of paracetamol required in 24 hours, VAS scores, and any other complications.

Sample size was calculated after doing a pilot study. Assuming 50% increase in the time of request for analgesia request as significant, keeping the power of the study at 80% and significance level of 95%, a total of 30 subjects were required in each group. Keeping in mind about possible dropouts we have included 35 patients in each group. Continuous data was analysed for normality using the “Kolmogorov Smirnov test” of normality. Normal distributed data was represented as mean $\pm$ SD and was assessed using the student’s t-test. Nonnormally distributed data was analysed using the Mann-Whitney U-test. A P value < 0.05 was considered significant.

Results

A total of 70 patients posted for TAH were included in the study. The demographic profile and duration of surgery were comparable in both the groups. (Table 1) The mean time to first analgesic request 10.2 $\pm$ 1.1hrs in group Q and 5.4 $\pm$ 1.7hrs in group T. (P < 0.05)

The total dose of paracetamol consumed in 24 hours was 1.8 $\pm$ 0.4 gm in group Q and 3.2 $\pm$ 0.7gm in group T. (P < 0.05) (Table 2) At different time intervals, VAS scores were significantly lower in the Group Q compared to the group T. (p < 0.05) (Table 3) There was no remarkable difference regarding PONV score, and sedation between the two groups. (Table 4)

Table 1: Descriptive variables of groups.

Variables	Group Q(n=35) (Mean±SD)	Group T(n=35) (Mean±SD)	P value
Age(years)	51.18±15.35	54.78±11.98	0.221
Female: Male(n)	30:5	31:4	0.254
ASA I/II (n)	19/16	18/17	0.214
Surgical time (mins)	96.38±18.59	94.33±17.54	0.139
BMI (kg/m ²)	24.4±2.21	23.5±2.51	0.232

Table 2: Total analgesic consumption in 24 hrs and time to first analgesia request

Parameters	Group Q (n=35) (Mean±SD)	Group T(n=35) (Mean±SD)	P value
Total analgesic consumption (Paracetamol in gm)	1.8± 0.4	3.2± 0.7	0.015
Time to 1 st rescue analgesia request (hrs)	10.2± 1.1	5.4± 1.7	0.018

Table 3: Post-operative VAS scores

Times of Measurement	Group Q(n=35) (Mean±SD)	Group T(n=35) (Mean±SD)	P value
20th min	1.35±2.16	1.24±2.25	0.251
40th min	1.9±2.13	1.35±1.38	0.226
1st h	1.8±1.24	1.26±1.45	0.226
3rd h	1.9±1.12	1.28±1.44	0.272
6th h	1.8±1.16	3.49±1.37	0.034
9th h	1.9±1.47	3.75±1.99	0.029
12th h	2.6±1.37	4.15±1.31	0.021
15 th h	2.7±1.28	4.16±1.48	0.226
18th h	2.6±1.94	4.43±1.38	0.282
21 st h	2.5±1.44	4.58±1.72	0.231
24th h	2.7±1.51	4.35±1.75	0.324

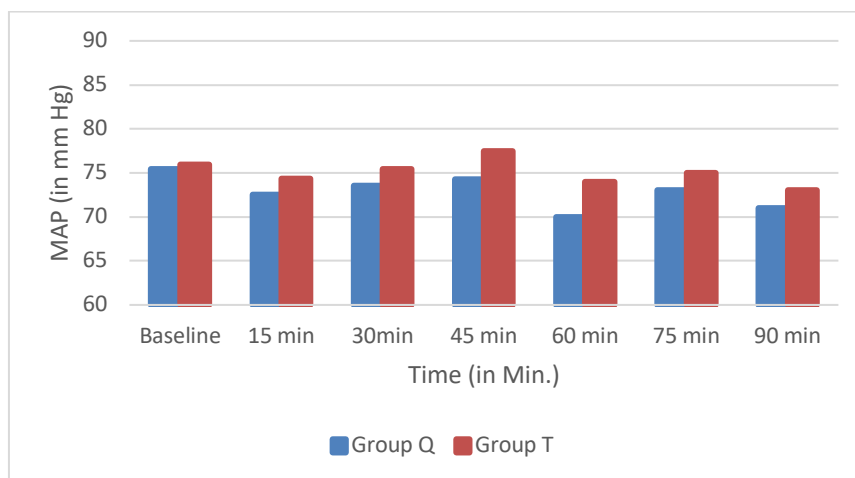
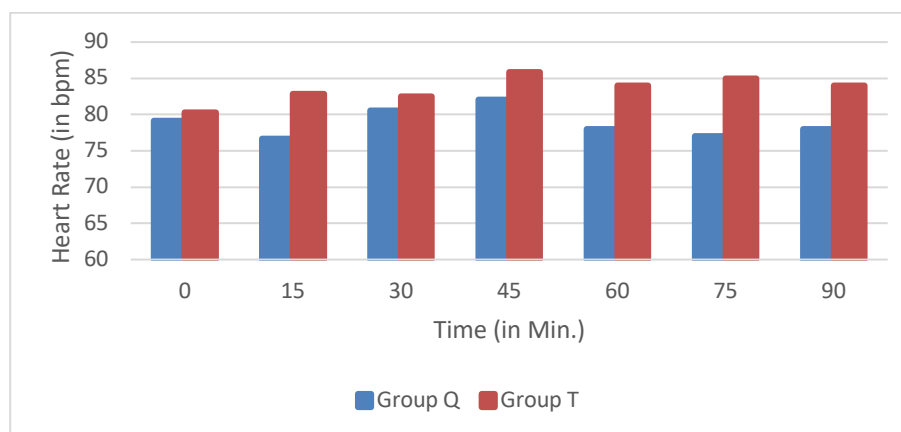
**Figure 1: Intraoperative changes in MAP in group Q and T****Figure 2: Intraoperative changes in heart rate in group Q and T**

Table 4: Incidence of PONV and sedation in group Q and T

	Group Q (n=35)	Group T (n=35)	P value
Nausea	4	3	0.241
Vomiting	3	4	0.242
Sedation	5	4	0.232

Discussion

Postoperative analgesia reduces the postoperative stress response, postoperative morbidity, and improves the surgical outcome in TAH. Abdominal truncal nerve blocks like TAP block and QLB have been described for postoperative analgesia. A number of studies have been done to prove their analgesic efficacy.

This study was conducted to compare the QLB with TAP block for postoperative analgesia following TAH under general anaesthesia. In our study, the VAS score was higher in Group T at all time intervals and significantly higher at the fourth and sixth hour ($P < 0.05$) than group Q.

This was similar to the study done by Naaz et al.[7] who compared the ultrasound-guided QLB and TAP block in patients undergoing TAH under general anaesthesia.

They found that the QLB group had a significantly better visual analogue scale (VAS) score from 6hr till 24 hr postoperatively. A study by Jadon et al.[6] showed similar results. They found that the VAS score was lower in the QLB group at 2, 4, 6, 8, 12, 18, and 24 hr than the control group. Huang et al.[8] compared the transmuscular QLB and oblique subcostal TAP block for analgesia after hysterectomy.

They found that NRS scores for visceral pain intensity were significantly lower in the QLB group than TAP group. Liu et al. [9] did a meta-analysis of eight randomized controlled trials involving 564 patients on QLB versus TAP block for postoperative analgesia in patients undergoing abdominal surgeries and got similar results. The meta-analysis showed a higher pain score in the TAP group at 2, 4, 6, 12 and 24 hr. Verma et al.[10] compared the QLB with TAP block for post-caesarean analgesia and found that the VAS score at rest and also with movement was less in the QLB group than the TAP group.

Yousef et al [11] compared the QLB and TAP block in patients undergoing TAH under general anaesthesia and observed that VAS scores were lower in the QLB group than the TAP group.

Asghar A et al [12] in their study recommended to include QLB as a part of multimodal analgesia in TAH as it is superior to TAP block in analgesic effect. Shukla et al [13] concluded that the combined posterior and anterior approach of the QLB may represent a more efficacious alternative

to the TAP block in patients after TAH. Roy A et al [14] concluded that QL block provided better perioperative analgesia than TAP block, in patients undergoing laparoscopic hernia repair which is in agreement with our study.

Conclusion

Ultrasound-Guided QLB prolonged the duration of postoperative analgesia and decreased analgesic requirement compared to TAP block in TAH without any side effects.

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