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ORIGINAL ARTICLE

Ultrasound Guided Transversus Abdominis Plane Block versus Quadratus Lumborum Block for Postoperative Analgesia in Patients Undergoing Total Abdominal Hysterectomy

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ABSTRACT

Background: Multimodal pain management program is needed to control severe pain after abdominal hysterectomy which is considered as one of the major abdominal surgeries. This study aimed to improve pain quality using ultrasound guided transversus abdominis plane block versus quadratus lumborum block in elective total abdominal hysterectomy under general anesthesia. **Methods:** This prospective, randomized controlled, double-blinded trial was carried out in Zagazig University Hospitals, anesthesia, Intensive care and Pain management department. The participants were randomly allocated into three equal groups, each group consist of 21 patients. Group C served as the control group, where each patient received only general anesthesia. In Group Transversus abdominis plane (TAP), each patient was administered general anesthesia plus bilateral TAP block. Group Quadratus lumborum (QL) involved patients receiving general anesthesia along with a bilateral QL block.

Results: The number of patients needed rescue analgesia was significantly lower in group QL compared to both groups (C&TAP). The time of first rescue analgesia (nalbuphine) was significantly early in group TAP compared to group QL. Performance time of block was shorter in TAP group compared to QL group. Visual analogue scale (VAS) score at 30 min ,2 ,4 and 8 hours post-operative was significantly lower in (TAP&QL) groups compared to group C. **Conclusions:** This study demonstrated that both transversus abdominis plane block and quadratus lumborum block are effective and safe for enhancing postoperative analgesia in patients undergoing total abdominal

hysterectomy, with superiority of quadratus lumborum block affirming it effectiveness in pain management.

Keywords: Transversus abdominis plane block; Quadratus lumborum block; Abdominal hysterectomy;Postoperative analgesia

INTRODUCTION

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 **[١].** There are many analgesic techniques for the prevention and treatment of pain after abdominal wall surgery. Neuraxial techniques, such as epidural analgesia, have been used for many years and remain the most commonly used analgesic techniques in abdominal wall surgery **[٢].** However, because of factors such as coagulopathy, sepsis, hypovolemia, neurologic disease, and complication risk, not all patients are candidates for neuraxial analgesia **[٣].** Preemptive analgesia is an intervention provided prior to initiating painful stimuli which may reduce or prevent subsequent pain. This antinociceptive treatment is intended to block the establishment of altered central processing of afferent input, which amplifies hyperalgesia and allodynia after surgery. By decreasing the altered central sensory processing, preemptive analgesia aims to diminish postoperative pain **[٤].** Transversus abdominis plane (TAP) block blocks the sensory afferent nerves run between the abdominal muscles **[٥].** It was first described in 2004 by **[٦].** later Ultrasound techniques (lateral,posterior and subcostal approaches) were then described and popularized by **[٧].** It has analgesic effects on anterolateral abdominal wall and parietal peritoneum that cover anterior division of the T6 to L1 spinal nerves, which runs into the plane between abdominal wall muscles **[٨].[٩]** was the first who described the quadratus lumborum block (QL). Somatic pain after upper and lower abdominal surgery can be controlled by QL **[١٠].** It can be performed for all generations (adult, pediatrics, and pregnant) **[١١].** The quadratus lumborum block (QL) is a posterior abdominal trunk block which produces analgesic effects through local anesthetic that covers thoracolumbar fascia and thoracic paravertebral space. Based on the injection position and approach, there are 3 QL techniques: anterolateral approach, posterior approach and anterior approach **[١٢].** The quadratus lumborum block (QL) is considered to be an easy technique to learn as it is easy to get the key of anatomic markers for QL. The novice can learn this block after only a few performances of the procedure. QL produces effective postoperative analgesia after abdominal surgery, laparoscopic surgery, anterior abdominal wall surgery, and hip and femur surgery. The analgesic effect of QL covers 24–48 h. While some authors' inserted catheter for continuous infusion of the local

anesthetic drug to extend the duration of postoperative analgesia, others added dexamethasone to local anesthetic to extend the effect of local anesthetic drugs **[١٣].**

METHODS

After approval of Institutional Review Board (9217-1-2022) Zagazig University and obtaining informed consent from each patient. The prospective randomized controlled double-blinded clinical trial was carried out in the Zagazig University Hospitals, anesthesia, Intensive care and Pain management department on Sixty-three female patients undergoing abdominal hysterectomy under general anesthesia, during period from February 2022 to October 2023.

Randomization:Patients were randomly allocated by a computer-generated randomized number table into three equal groups, each group contains **(21)** patients: **Group C**(n = 21patients) each patient received only general anesthesia, **Group TAP**(n= 21patients) each patient received general anesthesia plus bilateral TAP block.**Group QL**(n = 21patients) each patient received general anesthesia plus bilateral QL block.

Inclusion criteria werefemalepatients scheduled for elective abdominal hysterectomy under general anesthesia with age between 45 and 60 years and patients belonging to ASA Physical Status Class I or II with Body mass index (BMI) between 25 and 30 kg/m^2. Exclusion criteria werepatients showed infection at injection site, Patients have allergy to local anesthetics used. Patients with coagulation disorders, patients with physical or mental diseases which could interfere with the evaluation of pain scores and patients with advanced kidney or liver disease.

***Preoperative evaluation*:** Detailed history, physical examination and laboratory investigations was done which included complete blood count. random blood sugar. bleeding time, prothrombin time (PT), partial thromboplastin time (PTT). Liver and kidney function test, hepatitis c virus antibody (HCV) Ab, hepatitis b virus antigen (HBV Ag).Fasting 6-8 hours for solid foods, and 2 hours for clear fluids. Hemodynamics (heart rate and mean blood pressure) were recorded. patients were taught how to express their pain on an (11) point scale (VAS), from 0 to 10, with 0 for no pain, and 10 for the maximum pain ever felt. The patient was asked to put a mark on the line indicating their pain intensity and distance between that mark and the origin is measured by ruler to obtain the pain score, mild (0 - 3), moderate (4 - 6), and sever (>6) **[14].**

Intraoperative:On arrival of the patients to the operative room, standard monitoring was applied including five leads electrocardiography, noninvasive blood pressure and pulse oximetry, baseline parameters (mean blood pressure, heart rate, and peripheral oxygen saturation) were recorded. Intravenous line was inserted and intravenous fluid was started. For all groups, preoxygenation for 3min with 100%, general anesthesia was induced with IV injection of fentanyl (1 µg/kg) (Sunny Pharmaceutical, Egypt) and propofol (2 mg/kg) (AstraZeneca, UK), and then, atracurium (0.5 mg/kg) (GlaxoSmithKline, UK) was injected for endotracheal intubation. Mechanical

ventilation was maintained to keep end-tidal CO2 values between 34 and 36 mmHg. Anesthesia was continued with isoflurane 1%–2% in 100% O2. Incremental dose of atracurium (0.1 mg/kg) was given every 30 min. After endotracheal intubation and before the start of the surgery, anesthesiologist (who is blinded to the collected data until the end of the study) was performed the block techniques for patients in TAP and QL groups. Both blocks were performed under complete aseptic precautions using ultrasound machine with high frequency linear-curved probe covered with sterile sheath (Sonoscape® SSI-6000, Chinawith12-6 MHz high-frequency linear probe) and 100-mm needle (B Braun Medical Inc., Bethlehem, PA, USA). Time of performance of each block (time from ultrasound probe placement on the patient till the end of local anesthetic drug injection) was recorded.

***Transversus Abdominis Plane Block Procedure for (TAP) group*:** The patient was on supine position and the probe was located between the iliac crest and the lower costal margin in the anterior axillary line at the level of umbilicus and the layers of abdominal wall was identified (external oblique, internal oblique, and transversus abdominis muscles). In-plane technique was used and the tip of the needle was inserted between the internal oblique and transversus abdominis muscles (subcostal approach) **[15].** After negative aspiration (to exclude intravascular injection), 20 ml of 0.25% bupivacaine was injected. The same technique was performed on the other side.

Quadratus lumborum block procedure for (QL) group: The patient was positioned supine with lateral tilt to perform the block and the transducer was placed at the level of the anterior superior iliac spine and moved cranially until the three abdominal wall muscles were clearly identified. The external oblique muscle was followed postero-laterally until its posterior border is visualized (hook sign), leaving underneath the internal oblique muscle, like a roof over the quadratus lumborum muscle and the probe was tilted down to identify a bright hyper echoic line that represented the middle layer of the thoracolumbar fascia. The needle was inserted in plane from anterolateral to posteromedial. The needle tip was placed between the thoracolumbar fascia and the QL muscle **(11).** After negative aspiration, an injection of 20 mL of 0.25% bupivacaine was applied and the same technique was performed on the other side.

***For all patients' groups*:**Continuous monitoring and recording of patient hemodynamics including (heart rate and mean blood pressure). Both parameters were recorded every 5 min for first 30 minutes and then every 15 min till end of surgery. Intraoperative fentanyl 1–2 ug/kg was given if the heart rate or the mean blood pressure or both increase >20% of the baseline and total amount of intraoperative fentanyl given was recorded. About 30 min before the end of the surgical procedure, paracetamol (1gm IV) was given for all patients. If hypotension (mean blood pressure 20% lower than the basal) occurred, it was managed by fluid and/or a bolus dose of ephedrine 5 mg. if bradycardia (HR < 60 beats/min) occurred, it

was managed by atropine (0.01 mg/kg I.V). Isoflurane was discontinued on completion of the surgical procedure and neostigmine 0.05 mg/kg plus atropine 0.01 mg/kg were administered to reverse the effect of atracurium, after extubation, the patient was transferred to post anesthesia care unit (PACU).

Postoperative: All patients received paracetamol intravenous infusion as a standard analgesia at dose of 1g every 6 hours with maximum dose of paracetamol (4 g / day)**.**Postoperative pain was assessed via VAS score, it was recorded at (30 min, 2, 4, 8, 12, 16, and 24hr). If VAS score ≥3, incremental dosage of rescue analgesia (nalbuphine) 0.1- 0.2mg/kg (iv) was given, with maximum single dose of 20mg/kg. Hemodynamics (heart rate, mean blood pressure) were measured immediately and at (30min, 2, 4, 8, 12, 18 and 24hr).Time to first rescue analgesia (nalbuphine) (the time from extubation to the first given dose of rescue analgesia) and the total amount of nalbuphine dose in the 1st 24h were recorded. Also, number of patients needed rescue analgesia was recorded. The incidence of side effect (hypotension, nausea or vomiting) was recorded. Patient satisfaction for postoperative analgesia using 5-point scale (1= very unsatisfied, 2=unsatisfied, 3=fair, 4=satisfied, and 5= very satisfied) **(Tawfik et al., 2017)** at end of first 24hr.

***Primary outcome*:** Number of patients needed rescue analgesia forfirst 24h postoperatively.

Secondary outcome:Total amount of intraoperative fentanyl given.Time of performance of block.Postoperative hemodynamics (heart rate, mean blood pressure).Assessment of postoperative pain using VAS score.Total amount of rescue analgesic (nalbuphine) / Time to first rescue analgesia (nalbuphine) in the first 24h postoperative . and patient satisfaction for postoperative analgesia.

Sample Size: Assuming the percentage of patient's need post-operative analgesics was 77% vs 37%in transversus abdominis plane block group versus quadrates lumborum block group **(1).** At 80% power and 95 % CI, the estimated sample will be 63 cases, 21 cases in each group. Open epi.

STATISTICAL ANALYSIS

Data management using SPSS software package (IBM Corp. Released 2015. IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp). Quantitative data were expressed as the mean, standard deviation (± SD) & range for parametric data, while median and interquartile for non-parametric data. Qualitative data were expressed as absolute frequencies (number) & relative frequencies (percentage). t-test was used to compare between two groups. Anova (F) test was used for to compare between more than two groups of normally distributed variables. Bonferroni post hoc test was used to compare between each two group if Anova (F) test was statistically significant. Kruskal Wallis test was used to compare between more than two groups of non- normally distributed variables. Mann- Whitney test was used for to compare between two groups if Kruskal Wallis test was significant. Percent of categorical variables were compared using Chi-square test. Percent of categorical

variables were compared using Chi-square test. All tests were two sided. P-value < 0.05 was considered statistically significant and p-value > 0.05 was considered in statistically significant.

RESULTS

A total of seventy-five (**75)** patients were scheduled for elective open abdominal hysterectomy under general anesthesia. Twelve (**12**) patients were excluded as eight (**8)** were not meeting inclusion criteria and four (**4)** patients declined to participate. So, a total number of sixty-three **(63)** patients were randomly allocated into three equal groups, each group contains **(21)** patients; **Group C**(n = 21patients) each patient received only general anesthesia, **Group TAP**(n = 21patients) each patient received general anesthesia plus bilateral TAP block. **Group QL** (n = 21patients) each patient received general anesthesia plus bilateral QL block. All patients in three groups subjected to follow up and analysis without any lost (**Figure 1)**.Regarding age, BMI, ASA physical status and duration of surgery and anesthesia, there were no statistically significant differences among groups (p>0.05). **(table 1).**Regarding to total amount of intraoperative **fentanyl given** among groups, group C received statistically significantly higher intraoperative fentanyl given compared to both groups (TAP&QL) (p=0.0001) for both. While there was no statistically significant difference between group TAP& group QL(p>0.05). Regarding to time of performance of block between blocks groups. There was a statistically significantly shorter performance time of block in group TAP (8.05±1.36min) compared to group QL (11.52±1.66min) (p=0.0001) **(table 2).** Regarding intraoperative heart rate & mean arterial blood pressure there were no statistically significant differences among studied groups (p>0.05) for all. Regarding postoperative heart rate & mean arterial blood pressure immediately and at 30minutes, 2 ,4 and 8 hours there were statistically significantly lower in (TAP&QL) groups compared to group C (p<0.05). While, there were no statistically significant difference in (HR&MAP) between group TAP and group QL (p>0.05). Also, at 12 ,18 and 24hours there were no statistically significant differences in (HR&MAP) postoperatively among groups (p>0.05) **(table 3)**.Visual Analogue scale (VAS) score at 30 min ,2 ,4 and 8 hours post-operative was statistically significantly lower in (TAP&QL) groups compared to group C(p<0.05). Additional, at 12 ,16 and 24 hours postoperative there was no statistically significant differences in VAS score among studied groups (p>0.05). Also, there were no statistically significant difference in VAS score at all time intervals between group TAP and group QL (p>0.05) **(table 4).**

Time to first rescue analgesia (nalbuphine) was statistically significantly early in group C (0.76±0.22hr) compared to (TAP &QL) groups (p=0.0001 for both). In addition, the time to first rescue analgesia was statistically significantly early in group TAP (7.95±0.79hr) compared to group QL (12.44±0.99hr) (p=0.0001). Number of patients needed rescue analgesia 24hr postoperative was statistically significantly

lower in group TAP compared to group C (p=0.048). Also, it was statistically significantly lower in group QL compared to (C & TAP) groups (p=0.006 & p=0.045) respectively. Total amount of nalbuphine dose (mg) 24hr postoperative was statistically significantly lower in group TAP (8.17±1.47) compared to group C (10.52±1.5) (p=0.0003). Also, it was statistically significantly lower in group QL (5.88±1.5) compared to (C & TAP) groups (p=0.0001) for both **(table 5).**There was no statistically significant difference among studied groups regarding incidence of side effect (nausea / vomiting, hypotension and limb muscle weakness), (p≥0.05) for all. Patients' satisfaction was statistically significantly better in group (TAP &QL) compared to group C (p=0.04 & p=0.004) respectively. While, there was no statistically significant difference in patients' satisfaction between group TAP and group QL (p=0.78) **(table 6).**

Table 1: Patients' characteristics & Duration of surgery and anesthesia of studied groups

Variables	Group C N=21	Group TAP N=21	Group QL N=21	F/x^2	P
Age (years) Mean ±SD Range	51.76±4.81 45-60	51.24±4.69 45-60	52.48±4.34 45-59	0.381	0.685
BMI (kg/m^2) Mean ±SD Range	27.71±1.298 25.3-29.59	27.84±1.31 26.21-29.97	27.803±1.38 25.01-29.74	0.056	0.946
ASAn (%) I II	14(66.7%) 7(33.3%)	15(71.4%) 6(28.6%)	17(81.0%) 4(19.0%)	X^2 1.128	0.569
Duration of surgery(min) Mean ±SD Range	115.95±7.52 110-120	116.91±7.49 110-125	118.095±9.01 110-125	0.374	0.689
Duration of anesthesia(min) Mean ±SD Range	124.71±6.38 120-135	127.33±8.42 120-140	128.57±5.51 120-140	1.12	0.334

C=control. TAP= transversus abdominis plane. QL=quadratus lumborum.
BMI: body mass index.
ASA: The American Society of Anesthesiologistsphysical status.
Data were expressed as [Mean ± Standard deviation SD& Range, F= Anova test, χ 2= Chi-square test, number (N)& percentage (%)]. p≥0.05 was considered no statistically significant.

Table 2: Total amount of intraoperative fentanyl given(µg) and time of performance of the block

Variable	Group C N=21	Group TAP N=21	Group QL N=21	F/t	P	Post hoc		
						P1	P2	P3
Intraoperative Fentanyl given (µg) Mean ±SD Range	165.48±20.12 150-200	113.15±18.74 100-150	165.48±20.12 100-125	76.1	**0.0001***	**0.0001***	**0.0001***	0.541
Time of performance of the blocks (min) Mean ±SD Range	--	8.05±1.36 6-10	11.52±1.66 8-14	7.42 t	**0.0001***	--	--	--

C=control. TAP= transversus abdominis plane. QL=quadratus lumborum.
P1=Group C vs Group TAP, P2=Group C vs Group QL, P3= Group TAP vs Group QL.
Data were expressed as [Mean ± Standard deviation SD& Range, F= ANOVA test.
t= student test, post hoc test]. p*<0.05 was considered statistically significant.

Table 3: Postoperative heart rate (beat/min) and mean arterial pressure (MAP: mmHg) of studied groups

Postoperative Hemodynamics Mean ±SD Range		Group C N=21	Group TAP N=21	Group QL N=21	F	P	Post hoc		
							P1	P2	P3
Immediately	**HR**	82.14±7.398 72-98	69.95±7.24 58-82	71.86±7.51 60-83	16.57	**0.0001***	**0.0001***	**0.0001***	0.406
	MAP	70±5.08 61-80	62.48±5.69 52-75	62.81±5.36 55-77	13.1	**0.0001***	**0.0001***	**0.0001***	0.842
30min	**HR**	92±10.49 74-114	84.095±9.48 63-105	81.71±10.89 58-101	5.74	**0.005***	**0.04***	**0.006***	0.459
	MAP	69.24±6.62 59-80	63.095±4.87 56-72	61.86±5.08 55-75	10.5	**0.0001***	**0.002***	**0.0001***	0.457
2hr	**HR**	94.67±10.399 75-116	83.76±6.78 75-101	81.95±11.42 59-112	10.47	**0.0001***	**0.002***	**0.0001***	0.546
	MAP	68.62±6.32 58-79	64.05±5.55 55-78	62.57±4.84 55-74	6.64	**0.002***	**0.031***	**0.003***	0.397
4hr	**HR**	79.91±4.57 72-90	71.33±7.59 55-81	69.86±6.41 58-80	15.51	**0.0001***	**0.0001***	**0.0001***	0.452
	MAP	67.38±6.03 58-79	63.05±4.995 55-75	61.62±4.47 56-72	6.98	**0.002***	**0.027***	**0.002***	0.377
8hr	**HR**	80.95±5.996 69-89	72.33±8.92 54-84	70.86±8.101 57-82	10.34	**0.0001***	**0.002***	**0.0001***	0.54
	MAP	68.76±6.595 59-80	64.33±4.74 57-75	64.19±4.46 56-72	4.69	**0.01***	**0.028***	**0.022***	0.931
12hr	**HR**	84.33±11.52 63-102	82.14±10.24 63-100	82.48±8.32 69-98	0.286	0.752	-	-	-
	MAP	67.43±7.24 57-80	66.71±5.81 57-80	64.57±3.75 59-75	1.39	0.257	-	-	-
18hr	**HR**	72.57±5.78 64-85	73.48±6.21 61-82	73.095±5.56 60-82	0.126	0.882	-	-	-
	MAP	71.81±4.61 61-81	71.67±4.24 62-82	70.38±3.57 62-76	0.751	0.476	-	-	-

Postoperative Hemodynamics Mean ±SD Range		Group C N=21	Group TAP N=21	Group QL N=21	F	P	Post hoc P1	Post hoc P2	Post hoc P3
24 hr.	HR	73.14±5.83 63-84	74.24±5.85 64-84	72.43±6.09 58-84	0.497	0.611	-	-	-
	MAP	71.81±4.99 60-81	71.48±5.22 60-84	70.24±4.37 60-76	0.606	0.549	-	-	-

C=control. TAP= transversus abdominis plane. QL=quadratus lumborum.
P1=Group C vs Group TAP, P2=Group C vs Group QL, P3= Group TAP vs Group QL.
Data were expressed as [Mean ± Standard deviation SD& Range, F= ANOVA test, post hoc test].
p≥0.05 was considered no statistically significant.
p*<0.05 was considered statistically significant.

Table 4: Visual Analogue scale score for studied groups

VAS score	Group C N=21	Group TAP N=21	Group QL N=21	KW	P	Mann-Whitney P1	Mann-Whitney P2	Mann-Whitney P3
VAS 30 min	4(3.5-5)	2(1-2)	1(0.5-1.5)	44.559	**0.0001***	**0.0001***	**0.0001***	0.082
VAS 2h	4(3-5)	2(1-2)	1(1-2)	43.834	**0.0001***	**0.0001***	**0.0001***	0.250
VAS 4h	3(3-5)	2(2-3)	2(1.5-2.5)	33.051	**0.0001***	**0.0001***	**0.0001***	0.263
VAS 8h	3(2-4)	2(2-3)	2(2-3)	10.023	**0.007***	**0.005***	**0.004***	0.321
VAS 12h	3(2.5-4)	3(2-3)	3(2-3)	4.752	0.093	--	--	--
VAS 16h	3(3-4)	3(3-3)	3(2-3)	2.044	0.360	--	--	--
VAS 24h	3(3-4)	3(2.5-4)	3(2-3.5)	1.118	0.572	--	--	--

C=control. TAP= transversus abdominis plane. QL=quadratus lumborum.
P1=Group C vs Group TAP, P2=Group C vs Group QL, P3= Group TAP vs Group QL.
Data were expressed as [Median & interquartile range, KW= Kruskall Wallius test, Mann-Whitney test].
p≥0.05 was considered no statistically significant.
p*<0.05 was considered statistically significant**.**

Table 5: Time to first rescue analgesia (nalbuphine) and number of patients needed rescue analgesia and total amount of nalbuphine dose (mg) 24hr postoperativeof studied groups

Variable	Group C N=21	Group TAP N=21	Group QL N=21	F	P	Post hoc P1	Post hoc P2	Post hoc P3
Time (hr) to first rescue analgesia (nalbuphine) Mean ±SD Range	0.76±0.22 1/2hr-1hr	7.95±0.79 6.5-9hr	12.44±0.99 11-14hr	1259.8	**0.0001***	**0.0001***	**0.0001***	**0.0001***
Number of patients needed rescue analgesia n (%)	21(100%)	16(76.2%)	12(57.10%)	9.48	**0.008***	**0.048***	**0.006***	**0.045***
Total amount of nalbuphine dose (mg) 24hr postoperative **Mean ±SD** **Range**	10.52±1.5 8-12	8.17±1.47 6-10	5.88±1.5 4-8	31.61	**0.0001***	**0.0003***	**0.0001***	**0.0001***

C=control. TAP= transversus abdominis plane. QL=quadratus lumborum.
P1=Group C vs Group TAP, P2=Group C vs Group QL, P3= Group TAP vs Group QL.

Data were expressed as [Mean ± Standard deviation SD& Range, F= ANOVA test, post hoc test]. Data were expressed as [number & percent, Mean ± Standard deviation SD& Range, F= ANOVA test, χ 2= Chi-Square Test's, post hoc test]. p*<0.05 was considered statistically significant.

Table 6: Patients' satisfaction of studied groups

Patients' satisfaction n (%)	Group C N=21	Group TAP N=21	Group QL N=21	χ 2	P	P1	P2	P3
very unsatisfied	2(9.5%)	1(4.8%)	0.0	16.9	**0.031***	**0.041***	**0.004***	0.785
Unsatisfied	7(33.3%)	2(9.5%)	2(9.5%)					
Fair	9(42.9%)	6(28.6%)	4(19.0%)					
Satisfied	3(14.3%)	8(38.1%)	10(47.6%)					
very satisfied	0.0	4(19.0%)	5(23.9%)					

C=control. TAP= transversus abdominis plane. QL=quadratus lumborum
P1=Group C vs Group TAP, P2=Group C vs Group QL, P3= Group TAP vs Group QL.
Datawereexpressedas [numberandpercent, χ 2= Chi-Square test, post hoc test].
p*<0.05 was considered statistically significant.

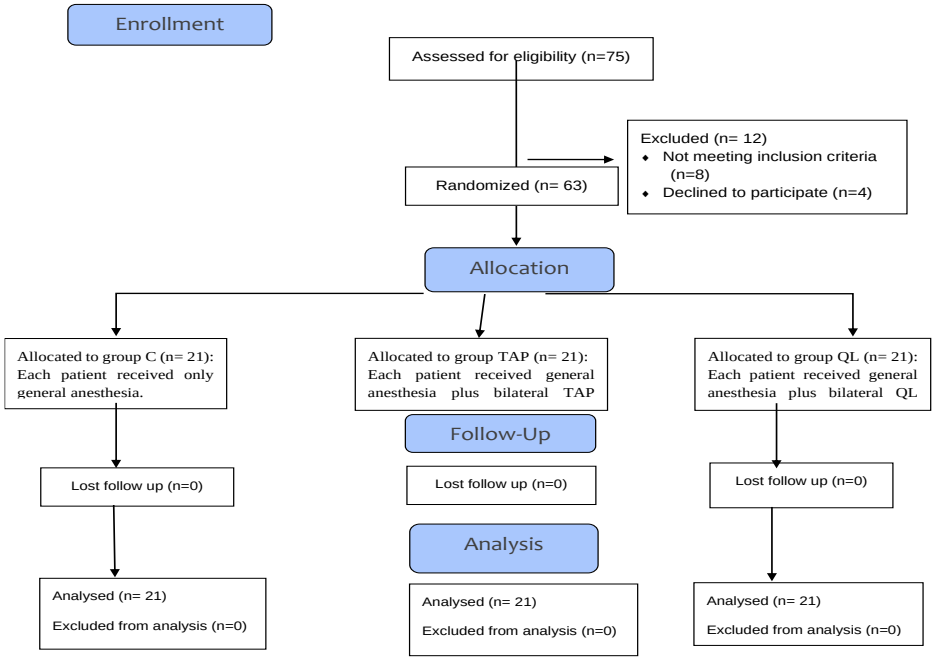

Figure (1): Consort Flow chart of the study

DISCUSSION

In the present study, there were no statistically significant differences among groups regarding **patient's characteristics** (Age, BMI and ASA physical status) Also, **duration of surgery and anesthesia** of studied groups .There was a statistically significant difference of **total amount of intraoperative fentanyl given** among groups. group C received statistically significantly higher intraoperative fentanyl given compared to both groups TAP&QL, while there was no statistically significant difference between group TAP& group QL. This is in agrees with

Alansary et al, [17], who compared QL and TAP blocks in patients who underwent total abdominal hysterectomy. that found no significant difference in intraoperative fentanyl dosage between both groups.In contrary to our study, **Yousef et al. [1]**, in their study found that overall fentanyl doses which were given intraoperatively significantly less in QL group than in TAP group. In our study, regarding to time of performance of block between blocks groups. There was a statistically significantly shorter performance time of block in group TAP compared to group QL.This came in agreement with **El-Boghdadly et al. [18],** who showed that TAP block is easier to perform and requires less time and lower level of expertise than QL.Also, **Tarek et al. [19]**showed that, the mean duration of performing block in the QL group was (9.45±1.77min) which was statistically significantly longer as compared with the TAP block group (5.98 ±1.76min).

In our study, **visual Analogue scale (VAS) score** at 30 min ,2 ,4 and 8 hours post-operative was statistically significantly lower in (TAP&QL) groups compared to group C. Additional, at 12 ,16 and 24 hours postoperative there was no statistically significant differences in VAS score among studied groups. Also, there were no statistically significant difference in VAS score at all time intervals between group TAP and group QL. Our results, agree with the conclusion of **Shafeek et al [20]** who compare between ultrasound guided quadratus lumborum block versus ultrasound guided transversus abdominis plane block in laparoscopic bariatric surgery, and found that post operative pain intensity (VAS) score was higher in control group up to 8hr than in groups (TAP&QL), with no difference between block groups.Also, came in agreement with the study of **Borys et al. [21]** and **Anju et al. [22],** which showed that there was no difference in pain severity on the first postoperative day between the QL and TAP block groups. Also, with **Jadon et al. [23]** who examined the efficacy of trans- muscular quadratus lumborum block in the multimodal regimen for postoperative analgesia after total laparoscopic hysterectomy and founded that lower VAS pain score in QL group when compared to control group. Also, this result in consistent with the study of **Sharma et al. [24]** who evaluate postoperative analgesic efficacy of transversus abdominis plane block after abdominal surgery and reported that, the categorical pain scores were lower in patients who received the TAP block at 2, 4, and 6 h postoperatively compared to group non received TAP block.While **Malla et al. [25]** reported that, The VAS scores were significantly better at every observation time in the QL block group than in the TAP block group. Also, **Oksuz et al**. **[26]** compared TAP block and QL block in pediatric patients undergoing lower abdominal surgery and reported that TAP block group showed significantly higher postoperative FLACC scores than QL block group.**Kumar et al.**https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9053692/ - b7-tjar-49-5-357 **[27]** also demonstrated lower pain scores in the QL block group than those of the patients in the TAP block group at different time intervals till 24 hours after lower abdominal surgeries.

Variations in the outcomes between different studies may be explained by the different blocks techniques and local anesthetics concentrations, also, effect of rescue analgesia has some role in results. Regarding to **intraoperative heart rate & mean arterial blood pressure** in the current study, there

were no statistically significant differences among studied groups. This is in consistent with **Naaz et al. [28]** who reported that, there were no statistical differences in hemodynamics (HR & MAP) among three groups in in patients undergoing total abdominal hysterectomy (TAH), when compare ultrasound guided quadratus lumborum block versus transversus abdominis plane block for post-operative analgesia.

In our results, **postoperative heart rate & mean arterial blood pressure** immediately and at 30minutes, 2 ,4 and 8 hours therewere statistically significantly lower in (TAP&QL) groups compared to group C. while, there were no statistically significant difference in (HR & MAP) between group TAP and group QL. Also, at 12 ,18 and 24hours there were no statistically significant differences in (HR & MAP) postoperatively among studied groups.Our results, agree with the conclusion of **Shafeek et al [20]** who found that post operative hemodynamics (HR& MAP) higher in control group up to 6hr than in groups (TAP&QL), with no difference between block groups.

In our study, regarding **time of first rescue analgesia (nalbuphine)** it was statistically significantly early in group C compared to (TAP &QL) groups. In addition, the time of first rescue analgesia was statistically significantly early in group TAP compared to group QL

In our study, **total amount of nalbuphine dose in first 24 hr. postoperative** was statistically significantly lower in group TAP compared to group C. Also, was statistically significantly lower in group QL compared to group C and group TAP. This is in consistent with **Naaz et al. [28]** who reported that, the duration of analgesia in patients undergoing total abdominal hysterectomy was found to be longer in the QL block group as compared to the TAP block and the control groups. They also recorded that the overall analgesic consumption was significantly less in the QL group in comparison with the TAP group. On the other hand, the TAP block was superior to the control group in these aspects.

This is in line with **Malla et al. [25]** who reported that, the time to request for first rescue analgesia and the total consumption of rescue analgesia in 48 h were observed. Patients who received QL block had significantly lower cumulative rescue analgesia doses than patients who received the TAP block at all time intervals recorded. They reported that, the mean duration of analgesia for US-guided TAP block was 8.5 h (6–12 h), and for QL block, it was 16.5 h (9–24 h), which shows statistically significant difference.This also agrees with **Blanco et al., [29].** In a randomized controlled trial, concluded that QL block produces more prolonged analgesia than TAP block. They also showed that the group receiving QL block had less postoperative morphine requirements than the TAP block group.

According to a different theory, the quadratus lumborum block produces widespread analgesia from the T7 to the L1 dermatomes, most likely as a result of local anesthetics spreading into the paravertebral space or the thoracolumbar plane, which has numerous sympathetic fibers and mechanoreceptors. This, in turn, contributes to widespread visceral and somatic analgesia **(11).** While the transversus abdominis plane block inhibits the thoracolumbar nerves T10 to L1, resulting in sufficient somatic analgesia and negligible or no visceral blockage **[30].**

In the present study, regarding **number of patients needed rescue analgesia**, it was

statistically significantly lower in group TAP compared to group C. Also, was statistically significantly lower in group QL compared to group C and group TAP. This agrees with **Oksuz et al., [26]** who reported that the number of patients who received rescue analgesia in the first 24 h postoperatively was significantly higher in TAP block group than in QL block group.Also, **Verma et al. [31]** who showed that in QL group, number of analgesic requests over 72 hours reduced significantly as compared to TAP block group.In our study, there was no statistically significant difference among studied groups regarding **incidence of side effect** (nausea/vomiting, hypotension and limb muscle weakness).

This is in agreement with **Naaz et al. [28]**and **Liu et al. [32]** which reported that, there was no significant difference in the incidence of postoperative nausea, vomiting and other adverse effects among the groups.

In our study, **patients' satisfaction** was statistically significantly better in group (TAP&QL) compared to group C. While, there was no statistically significant difference in patients' satisfaction between group TAP and group QL.Similar to our results, a study done by **Naaz et al [28],** found that There was no difference in patient satisfaction between QL group and group TAP group. The patients of both QL & TAP groups were more satisfied than the control group for postoperative analgesia. While **Shukla et al [33].** In their study found that patient satisfaction was significantly higher in group QL than group TAP. Also, **Oksuz et al., [26]** reported that patient's satisfaction scores were lower in TAP block group than in QL block group.

LIMITATION

The current study had some limitations. We did not test the sensory block plane in these patients before surgery, also we did not know the optimal dose of local anesthetics for plane block. Higher dose or volume of local anesthetics may have role for improve and prolong the analgesic effect. The given analgesics may have some role to play in VAS score assessment, also we did not assess the dynamic pain scores in this study. Technical problems encountered during the study included the need of assistance to position the patients in lateral decubitus in order to perform QL group, also ultrasound-guided needle placement, it was dependent upon the skills and expertise of the operator.

CONCLUSIONS

Our study demonstrated that both bilateral quadratus lumborum block and transversus abdominis plane block are effective and safe for enhancing postoperative analgesia in patients undergoing elective total abdominal hysterectomy, surpassing the efficacy of general anesthesia alone. The quadratus lumborum block provided more sustained analgesia and significantly reduced the need for rescue analgesia compared to the transversus abdominis plane block. affirming it effectiveness in pain management.

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