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Comparative study of three different techniques for postoperative analgesia after abdominal hysterectomy

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Abstract

Background: Our hypothesis posited that the quadratus lumborum block (QLB) is superior to both local wound infiltration (LWI) and the transversus abdominis plane (TAP) block in reducing visual analogue scale (VAS) and overall morphine use. The aim of this study was to assess and contrast the pain-relieving effectiveness of ultrasound guided QLB, ultrasound guided TAP block, and LWI in female patients undergoing abdominal hysterectomy.

Methods: The study was carried out on a sample of 105 female patients, ranging in age from 40 to 65 years, who had an ASA physical status of I or II. The participants were scheduled to have elective abdominal hysterectomy, and the trial was conducted using a prospective randomized, double-blinded design. The participants were allocated into 3 equal groups by a random process, with each group including 35 individuals. Group I: Ultrasound-guided QLB group. Group II: Ultrasound-guided TAP group. Group III: LWI group.

Results: VAS showed a statistically significant difference among the 3 groups at 6, 12, and 24 hours (P value <0.001), while no significant difference occurred at 1, 2, and 4 hours among 3 groups. After 6 hours, the VAS scores were similar in group I and group II, but considerably lower in both groups compared to group III ($p<0.001$). After 12 hours, the VAS score was considerably lower in group I compared to group II and group III. Additionally, there was an increase in VAS score in group III when compared to group II ($p<0.05$). After 24 hours, a comparison among 3 groups revealed a drop in VAS in group I compared to the other two groups ($p<0.05$), although there was no significant difference between group II and group III.

Conclusions: Ultrasound-guided QLB outperformed Ultrasound-guided TAP block and LWI in managing postoperative pain after abdominal hysterectomy. This superiority was shown in terms of pain score, total morphine use, duration of pain relief and time of first request for pain relief.

Keywords: Quadratus lumborum block, Transversus abdominis plane, local wound infiltration, hysterectomy

Introduction

Abdominal hysterectomy is a frequently done surgery that over the first 24 hours following surgery results in noticeable moderate to severe pain and discomfort [1-3].

Optimal treatment of pain after surgery is crucial for facilitating prompt movement and enhancing patient contentment. Inadequate management of pain during surgery is linked to higher rates of illness and may sometimes progress into long-lasting discomfort after the operation [4, 5].

Only by visualizing anatomical components with ultrasound can safe, high-quality blocks be achieved via appropriate needle placement. Furthermore, by closely observing the distribution of spots, it's possible that less local anaesthetic will be needed for a successful nerve block [6].

The QLB type 2 is a technique used to provide local anesthesia in the posterior abdominal wall. Anesthetic is injected beneath the quadratus lumborum muscle in this procedure, enabling it to penetrate the thoracolumbar fascia's middle layer [7, 8]. The paravertebral region may be reached by the local anaesthetic that was administered to this fascial plane and spread along the vascular-nervous channels, resulting in the desired block [9].

The lateral transversus abdominis plane (TAP) block is a well-established component of the multimodal pain management strategy for abdominal surgeries [10].

The purpose of the TAP block is to numb the nerves that provide sensation to the front part of the abdominal wall, namely from the T6 to L1 spinal levels. A local anaesthetic is injected during the procedure into the area that is between the internal oblique muscles and transversus abdominis. TAP blocks, often administered under ultrasonographic supervision, provide post-operative analgesia [11, 12].

Anaesthetics administration directly into the skin and subcutaneous tissue might be considered the most straightforward method for achieving pain relief. The operation is considered safe, with little side effects and a low risk of toxicity [13].

Our hypothesis posited that QLB is superior to TAP block and local wound infiltration (LWI) in reducing both total morphine intake and visual analogue scale scores.

This research aims to evaluate the effectiveness of ultrasound-guided QLB for post-operative pain relief, as well as ultrasound-guided TAP block and LWI, in female patients who have had abdominal hysterectomy.

Patients and Methods

This study was conducted on 105 female patients aged 40 to 65 years, with physical statuses classified as American Society of Anesthesiologists (ASA) I and II. The patients were admitted to the operating room at Tanta University Hospital for elective abdominal hysterectomy between August 2020 and August 2021. The study was prospective, randomized, and double-blinded.

The institutional ethical committee gave its permission before the study started. Every patient provided written, informed consent. Exclusion criteria were patient refusal, patients with contraindication for regional block as: bleeding disorders, and injection site infection, patients with hypersensitivity to the study drugs, and uncooperative patients.

Randomization and blindness

Randomization was accomplished using opaque, sealed envelopes and a computer-generated number. Patients were randomly classified into 3 equal groups, each group contained 35 patients. Group I: Ultrasound-guided QLB group. Group II: Ultrasound-guided TAP group. Group III: LWI group.

The study was double blinded in which all patients, and other health care provider engaged in postoperative care were blinded to the technique.

Preoperative

The process of gathering historical information, which includes the patient's medical history, previous experiences with anesthesia and surgery, and any known allergies to medications, is conducted. Additionally, a clinical examination is performed, along with routine laboratory investigations such as a complete blood count (CBC), prothrombin time, and kidney and liver function tests. Following the evaluation of preanesthetic, every patient participating in the study are aware of the VAS, which ranges from 0 (Indicating painless) to 10 (representing the most severe pain that might possibly exist).

Intraoperative

Upon reaching the operating room, patients connected to monitors comprising an electrocardiogram (ECG), non-invasive blood pressure (NIBP), and pulse oximetry (SpO_2). Initial measurements were taken, and an intravenous canula with a gauge of 20 was inserted. Prior to the initiation of general anaesthesia, a premedication of midazolam (0.02 mg/kg) administered intravenously. Preoxygenation for 2-3 minutes used for the induction of general anaesthesia, followed by a gradual infusion of propofol (1.5 mg/kg) and fentanyl (100 micrograms). This is then followed by the administration of atracurium (0.5 mg/kg), as a muscle relaxant. Manual breathing was maintained until complete muscle relaxation was achieved, at which point endotracheal intubation was carried out. The anaesthesia was sustained using a combination of O_2 and air, with a concentration of 1.5% isoflurane and atracurium (0.1 mg/kg) administered every 30 minutes. The end-tidal CO_2 concentration was kept between 35 and 40 mmHg by using mechanical ventilation.

Timing of the block

After surgeries in both group I and group II, sonar guided blocks were applied. The surgeon conducted the wound infiltration in group III.

Group I: QLB group:

The patient was placed in a lateral posture, with their face turned towards the side that was to be blocked upwards. The Philips CX50 ultrasound machine was positioned in mid-axillary line, just above the iliac crest, in order to capture precise and distinct pictures. The high frequency linear probe was used to differentiate the three layers of the anterior abdominal wall: the transversus abdominis muscles, the internal oblique, and the external oblique. The scanning was conducted in a transverse direction, progressing posteriorly, until the Transversus abdominis muscle reached an aponeurotic state. The aponeurosis was traced until the QL muscle became clearly evident, connected to the lateral margin of the transverse process of the L4 vertebral body. The erector spinae muscle was located in the back, whereas the psoas major muscle was located at the front. This configuration assumed a distinct layout that bore a resemblance to a Shamrock, with three leaves. A blunt-tipped block needle, measuring 18-20 gauge in diameter, was inserted parallel to the skin and subcutaneous tissue. The needle was advanced towards the posterior border of the Quadratus Lumborum (QL) muscle, specifically between the QL muscle and the erector spinae muscle. The needle was continually moved forward under the supervision of ultrasonography to avoid unintentional entry of the kidney or large intestine. To confirm the precise placement of the needle tip, a 1ml test dose of saline was delivered. Afterwards, a total of 20 ml of bupivacaine solution with a concentration of 0.25% was administered, and the spread of the injected material was seen using ultrasonography. Figure 1

Group II: TAP group

Throughout the TAP block technique, the patient assumed a supine position. Afterwards, a high-frequency linear probe from the Philips CX50 ultrasound machine was positioned at the umbilicus level in the anterior axillary line, namely between the iliac crest and the lower costal edge. The constituents of the abdominal wall, including the external oblique, middle oblique, and transversus abdominis muscles, were accurately recognized. An 18–20-gauge block needle with a blunt tip was inserted medially towards the anterior superior iliac spine. The needle pierced through skin, subcutaneous tissue, external oblique muscle, internal oblique muscle, until it reached the point between the internal oblique muscle and the transversus abdominis muscle. The needle was continuously advanced under ultrasound supervision to prevent puncturing the intestines and peritoneum. The peritoneum was distinguished by observing the movement of the intestine. A 1 ml test dose of saline was administered to confirm the precise placement of the needle tip. Afterwards, a slow infusion of 20 millilitres of bupivacaine solution with a concentration of 0.25% was administered following aspiration. The distribution of the injected drug was observed using ultrasonography (Figure 2).

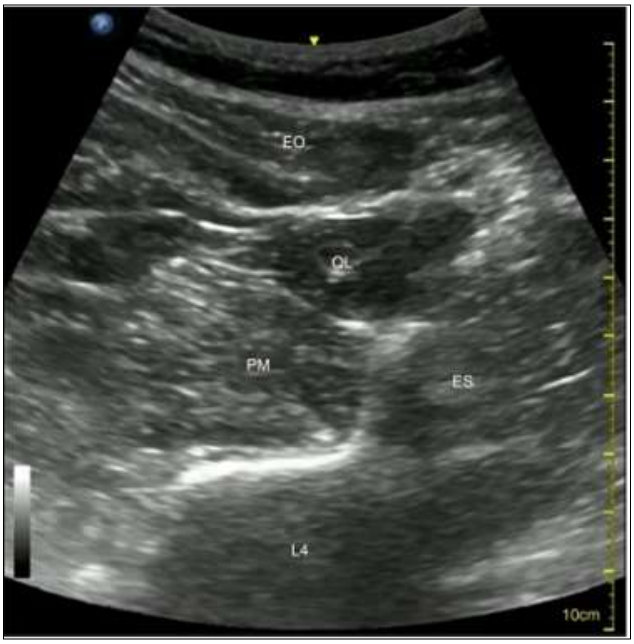

Fig 1: Ultrasound picture of the QL type II before a local anaesthetic was injected (EO = external oblique, ES = Erector Spinae, L4 = Lumbar 4, PM = Psoas Major, QL = Quadratus Lumborum)

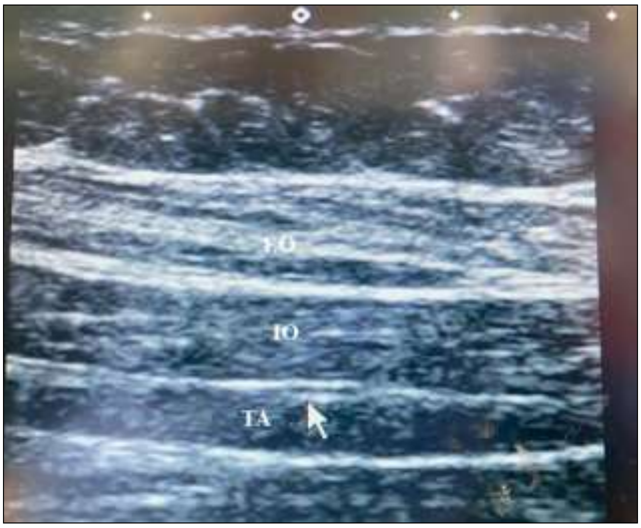

Fig 2: TAP block prior to the administration of a local anaesthetic. (EO - external oblique; IO - internal oblique; TA: transversus abdominis)

Group III: LWI group

Prior to suturing the skin, the surgeon administered 20ml of 0.25% bupivacaine along the incision line, on both sides of the wound. Following the administration, isoflurane was ceased, and subsequently, neostigmine at a dosage of 0.05 mg/kg together with atropine at a dosage of 0.01mg/kg was administered to counteract the effects of atracurium.

Postoperative

After the patient regained consciousness and reached a sufficient level of awareness, they were removed from the operating room. The assessment of postoperative pain was conducted using a VAS at certain time intervals: 1st, 2nd, 4th, 6th, 12th, and 24th hours after the surgical procedure. A 3 mg of morphine was administered intravenously if the VAS score reached or exceeded 4.

Measurements

The study collected data on various demographic factors, including age, BMI, ASA classification, duration of surgery, and hemodynamic profile. Additionally, the study recorded the VAS scores at specific time intervals after the surgery, the time to the first request for analgesics, the total consumption of morphine within the first 24 hours, and any adverse effects such as nausea, vomiting, local anaesthetic toxicity, and complications related to the blocks (e.g., hematoma, infection, bowel or kidney injury). Furthermore, the study assessed overall patient satisfaction with analgesia using a 5-point verbal scale ranging from very satisfied to very dissatisfied [14].

Sample size calculation

The sample size was determined using the Epi-Info statistical tool, developed jointly by the World Health Organisation and the Centres for Disease Control and Prevention in Atlanta, Georgia, USA. The used version was 2002. The determination of the sample size was based on the following factors: The expected difference in total morphine consumption, which is the primary measure was 15% between the QLB and TAP group. The estimate was conducted using a 95% confidence interval, whereas the trial had a statistical power of 80%. It took a total of 33 patients to obtain this difference in morphine use. To take on the problem of dropout, we conducted our study using a sample size of 35 people for each group.

Statistical analysis

The statistical analysis was conducted using SPSS version 25, a program developed by IBM Inc. in Chicago, IL, USA. The Shapiro-Wilks normality test and histograms were used to assess the distribution of quantitative data in order to determine the appropriate kind of statistical testing, whether it be parametric or nonparametric. The parametric variables, such as age, were quantified using the statistical metrics of mean and standard deviation (SD). The F test was used to compare the three groups, while a post hoc (Tukey) test was performed to assess the differences between each pair of groups. The paired T-test was used to compare two variables within a single group. The non-parametric variables, such as VAS, were represented by the median and interquartile range (IQR) and evaluated using the Kruskal-Wallis test. Furthermore, an additional analysis was conducted using the Mann-Whitney (U) test to compare each individual pair of groups. The Wilcoxon test was used to compare two variables inside a single group. The ASA physical status, a categorical variable, was analyzed by presenting it as frequencies and percentages. The statistical significance of the study was assessed using the Chi-square test. A P value less than or equal to 0.05 was deemed to be statistically significant.

Results

There was no significant difference in age, ASA, BMI and duration of surgery among 3 groups. (Table 1)

Table 1: Table shows difference between demographic data of patient between 3 groups

		Group I (n = 35)	Group II (n = 35)	Group III (n = 35)	P value
Age (years)	Mean ± SD	53.03±6.93	54.09±6.87	52.89±7.09	0.734
	Range	40 - 63	42 - 65	41 - 65	
ASA physical status	I	17 (48.57%)	14 (40.00%)	15 (42.86%)	0.763
	II	18 (51.43%)	21 (60.00%)	20 (57.14%)	
BMI (kg/m^2)	Mean ± SD	28.72±5.23	27.520±3.97	26.7±5.19	0.217
	Range	21.1 - 37.9	21.5 – 34.5	21.1 - 38	
Duration of surgery (min)	Mean ± SD	119.86±19.15	114.86±20.67	115.86± 18.65	0.445
	Range	90 - 150	90 - 150	90 - 150	

Data are presented as Mean ± SD. ASA: American society of anesthesiology. BMI: body mass index

The VAS demonstrated a statistically significant difference among 3 groups at 6, 12, and 24 hours . However, there was no statistically significant disparity observed at 1, 2, and 4 hours among 3 groups. Following a duration of 6 hours, the VAS scores exhibited no significant difference between group I and group II, however, they were significantly lower in both groups compared to group III (P <0.001). Group I exhibited a significantly lower VAS score compared to group II and group III after a duration of 12 hours. Furthermore, there was a rise in the VAS score in group III in comparison to group II (P <0.05). Following a 24-hour period, a comparison of the three groups shown a decrease in VAS in group I, in contrast to the other two groups (P <0.05). Nevertheless, no substantial disparity was seen between group II and group III. (Table 2).

Table 2: Table shows comparison between VAS in 3 groups

	Group I (n = 35)		Group II (n = 35)		Group III (n = 35)		P value	
	Median	IQR	Median	IQR	Median	IQR		
1h	2	2-3	2	1-3	2	2-3	0.464	---
2h	2	1-3	2	1-3	2	1.5-3	0.956	---
4h	2	1-3	3	2-3	2	2-3	0.570	---
6h	2	1-3	2	1-3	4	3-5	<0.001*	P1 = 0.898 P2 <0.001* P3 <0.001*
12h	2	1-2	3	2-3.5	5	3.5-5	<0.001*	P1 <0.001* P2 <0.001* P3 = 0.008*
24h	2	2-3	3	3-4	3	3-5	<0.001*	P1 <0.001* P2 <0.001* P3 = 0.391

P1: p value between Group I and Group II, P2: p value between Group I and Group III, P3: p value between Group II and Group III

Group I had a time interval between the start of the study and the first request for morphine that varied from 16 to 24 hr., with an average of 19.13 ± 3.27. Group II had a time interval ranging from 7 to 14 hr., with an average of 10.37 ± 2.24. Group III had a time interval ranging from 3 to 6 hr., with an average of 5.2 ± 1.18. Group I had a significant delay in obtaining their first dosage of morphine compared to groups II and III. Furthermore, group II had an even greater delay than group III. The participants in groups I, II, and III exhibited varying degrees of morphine intake, with values ranging from 3 to 6. The average consumption levels for these groups were 3.51 ± 1.15, 5.14 ± 2.13, and 8.49 ± 1.54, respectively. Groups I and II exhibited a significant decrease in total morphine intake, also group II had a significantly lower total morphine consumption compared to group III (P value <0.001).

Table 3: Table shows comparison between time to 1st morphine request and total morphine consumption among the three groups.

		Group I (n = 35)	Group II (n = 35)	Group III (n = 35)	P value	Post hoc
Time to 1st morphine request (h)	Mean ± SD	19.13±3.27	10.37±2.24	5.2±1.18	<0.001*	P1 <0.001* P2 <0.001* P3 <0.001*
	Range	16 - 24	7 - 14	3 - 6		
Total morphine consumption (mg)	Mean ± SD	3.51±1.15	5.14±2.13	8.49±1.54	<0.001*	P1 <0.001* P2 <0.001* P3 <0.001*
	Range	3 - 6	3 - 9	6 - 12		

P1: p value between Group I and Group II, P2: p value between Group I and Group III, P3: p value between Group II and Group III

There were no significant differences in postoperative heart rate (HR) and mean arterial pressure (MAP) among the three groups at 1, 2, and 4 hours. Following a duration of 6 hours, there was an absence of any notable disparity in the postoperative HR and MAP between group I and group II. Nevertheless, both group I and group II exhibited significantly reduced HR and MAP in comparison to group III. At the 12-hour mark, the postoperative HR and MAP were significantly lower in group I and group II compared to group III (*p*<0.05), while there was no statistically significant difference between group I and group II. After a duration of 24 hours, a thorough examination of the three groups indicated a significant reduction in postoperative HR and MAP in group I as compared to the other two groups. Nevertheless, no substantial disparity was seen between group II and group III (Table 4)

Table 4: Table shows comparison between Postoperative HR (beats/min), and MAP (mmHg) changes among 3 groups

	Group I (n = 35)		Group II (n = 35)		Group III (n = 35)		P value	Post hoc
	Mean	SD	Mean	SD	Mean	SD		
1h	77.23	9.11	73.97	9.12	75.91	11.57	0.394	---
2h	76.20	8.93	74.00	8.83	75.17	12.14	0.660	---
4h	77.63	10.24	73.23	10.00	78.66	10.72	0.070	---
6h	77.83	9.53	73.37	9.20	100.57	14.18	<0.001*	P1 = 0.224 P2 <0.001* P3 <0.001*
12h	78.71	9.49	85.00	15.43	91.14	16.67	0.002*	P1 = 0.453 P2 = 0.001* P3 = 0.044*
24h	78.46	10.32	86.69	13.87	88.14	12.32	0.003	P1 = 0.016* P2 = 0.004* P3 = 0.873
1h	85.91	6.45	86.77	7.12	86.97	6.76	0.787	---
2h	86.40	7.07	86.46	8.03	87.26	7.82	0.872	---
4h	84.91	6.74	86.03	7.56	83.63	10.84	0.505	---
6h	86.11	7.14	87.14	8.08	97.77	17.21	<0.001*	P1 = 0.929 P2 <0.001* P3 <0.001*
12h	88.31	7.41	93.49	12.14	102.69	11.99	<0.001*	P1 = 0.114 P2 <0.001* P3 <0.002*
24h	82.09	11.84	94.49	11.82	95.37	12.67	<0.001*	P1 <0.001* P2 <0.001* P3 =0.950

Postoperative nausea and vomiting (PONV) occurred in 4 patients (11.43%) in group I, 4 patients (11.43%) in group II, and 7 patients (20.0%) in group III. There were no instances of hematoma, local anaesthetic toxicity, renal impairment, or intestinal injury in any patients. There were no significant differences in the occurrence of PONV among the three groups. (Table 5)

Table 5: Table shows comparison between side effects among 3 groups

	Group I (n = 35)	Group II (n = 35)	Group III (n = 35)	P value
PONV	4(11.43%)	4 (11.43%)	7(20.0%)	**0.496**
Hematoma	0 (0.0%)	0 (0.0%)	0 (0.0%)	---
LAST	0 (0.0%)	0 (0.0%)	0 (0.0%)	---
kidney injury	0 (0.0%)	0 (0.0%)	0 (0.0%)	---
Intestine injury	0 (0.0%)	0 (0.0%)	0 (0.0%)	---

PONV: postoperative nausea and vomiting, LAST: Local anesthetic toxicity

Group I demonstrated significantly greater patient satisfaction in comparison to both group II and group III (P value = 0.008, <0.001). In addition, Group II exhibited considerably greater patient satisfaction compared to Group III. (Table 6)

Table 6: Table shows patient satisfaction among 3 groups

	Group I (n = 35)	Group II (n = 35)	Group III (n = 35)	P value
Very dissatisfied	0 (0%)	0 (0%)	0 (0%)	*p*<0.001
Some-what dissatisfied	0 (0%)	0 (0%)	2 (5.71%)	
Neither satisfied nor dissatisfied	1 (2.86%)	2 (5.71%)	27 (77.14%)	
Some-what satisfied	4 (11.43%)	15 (42.86%)	4 (11.43%)	
Very satisfied	30 (85.71%)	18 (51.43%)	2 (5.71%)	
P1= 0.008*, P2<0.001*, P3 <0.001*				

P1: P value between Group I and Group II, P2: P value between Group I and Group III, P3: P value between Group II and Group III

Discussion

Utilizing ultrasound guidance QLB is technical procedure known as "interfascial plane block," that include the posterior abdominal wall. This block is exclusively executed under the guidance of ultrasonography. Anaesthesiologist Dr. Rafael Blanco descripted it as an alternative form of the

TAP block. Subsequently, he provided an elaborate exposition of the block methodology under the designation QLB [15].

In the present study, we found that QLB group was superior to TAP group and LWI group as regard postoperative analgesia. This was evidenced by significantly lower VAS at most measurement times, total morphine consumption, longer time of first analgesic request and more patient satisfaction. On the other hand comparison between TAP and LWI found that TAP was superior to LWI as regard the same measurements.

The significant decrease in the VAS score can be attributed to the analgesic effects of QLB from T5 to L1, which also provides pain relief for both visceral and somatic pain. In contrast, the TAP block involves the administration of local anesthetics in the transversus abdominis fascial plane, which blocks sensation specifically along the anterior abdominal wall from T7 to L1 [16, 17].

Although the true mechanism of the QLB block is still unknown, it is believed that the thoraco-lumbar fascia plays a primary role in the mechanism of action of the QLB as it contains mechanoreceptors, nociceptors and has rich sympathetic innervation. The spread of local anesthetic leads to blocking of the sympathetic formations in this facial plane which has been suggested by Blanco *et al*., [18] and can explain the long-lasting analgesic effect of QL block and also believed to be responsible for the visceral pain coverage.

Consistent with our findings, Jadon *et al*. [19] concluded For women having a caesarean section, QLB extends the duration of pain relief and reduces the need for supplementary analgesics in comparison to the TAP block. Similar to our finding, Alansary *et al*. [20] determined that QLB administered after total abdominal hysterectomy (TAH) was more efficacious in alleviating visceral and somatic pain compared to TAP block. Based on the findings reported by Oksüz *et al*. [21], it was determined that the QLB offered more prolonged and efficacious postoperative analgesia in paediatrics receiving orchiopexy or unilateral surgery of an inguinal hernia when compared to the TAP block.

In the same line with our findings, Murouchi *et al*. [22] determined that QLB produced a more extensive and prolonged analgesic effect than lateral TAP block. The difference was explained by the drug's partial displacement during QLB from the intermuscular to the paravertebral spaces. Moreover, Stopar *et al*. [23] Contrasted QLB determined that the use of posteromedial QLB resulted in reduced opioid usage during a 24-hour period, as compared to wound infiltration. This may be attributed to its ability to alleviate visceral pain, Ranjit *et al*. [24] concluded that it was successful to lower postoperative pain scores hours after surgery with bilateral TAP block. Additionally, this block was effective in lowering the need for postoperative opioids. Also, in agreement with our results, Kendigelen *et al*. [25] compared the analgesic effectiveness of wound infiltration and ultrasound-assisted TAP block during the initial twenty-four hours postoperatively. Following the procedure, 40 patients had wound infiltration (INF group) and 40 patients underwent TAP block. It was observed that the TAP group exhibited reduced postoperative pain scores in comparison to the INF group. The consumption of analgesics was considerably greater in the INF group. In the INF group, both the incidence and total amount of supplementary analgesics administered during the first twenty-four hours after surgery were substantially greater. They concluded that TAP block is a useful technique, drug dose, and volume reduction method for paediatrics having surgery for an inguinal hernia. Similarly with our findings, Riad *et al*. [26] concluded that when compared to LWI, bilateral TAP block successfully decreased postoperative pain and the overall amount of opioid and analgesic medication used during the 24-hour period following a caesarean delivery. In contrast with our results, Sertcakacilar *et al*. [27] determined that lateral QL and TAP blocks produced comparable levels of postoperative opioid consumption and analgesia during laparoscopic appendectomy. As a result, they concluded that both blocks effectively alleviate pain following laparoscopic appendectomy. This disparity was attributable to the various types of operations executed.

Also, Telnes *et al*. [28], Upon evaluating the effects of TAP block and wound infiltration in caesarean section (CS), the researchers found that TAP block did not have any influence on the overall quantity of morphine used after the procedure. Both groups received approximately identical amounts of morphine over a 48-hour period. The differentiation was established due to the administration of conventional spinal anaesthetic to all individuals, using fentanyl 20 μg and hyperbaric bupivacaine 0.5% 10 mg. Additionally, the presence of two clinicians conducting TAP block and multiple obstetricians conducting infiltration of the surgical incision contributed to this variation.

In contrast with our result Tawfik *et al*. [29] It was determined that in parturient having spinal anaesthesia for caesarean birth, there were no statistically significant differences between TAP block and wound infiltration in terms of postoperative fentanyl use and pain scores. Different types of anesthesia were utilized in our investigation, including spinal anesthesia. Additionally, by patient-controlled analgesia, intravenous fentanyl and postoperative standard analgesics (ketorolac and paracetamol) were given to all individuals. Also, in contrast with our results Gabriel *et al*. [30] discovered that there is no difference between the analgesic time and VAS between the blocks. They concluded that there was no clinically significant difference in the pain results between TAP and surgical wound infiltration. This difference from our results explained by their use of intrathecal opioids.

In the present study regarding to postoperative hemodynamics (HR and MAP) more stable hemodynamic was observed in QLB as compared the other two studied groups.

Consistent with our findings, Mohamed *et al*. [31] concluded that when it came to pain scores, analgesia duration, and the absence of related hemodynamics instability, ultrasound guided QLB superior to ultrasound guided TAP block for managing postoperative pain following unilateral inguinal surgery. Also, Mitchell *et al*. [32] found that QLB and TAP had lower HR and MAP than LWI and were comparable. Moreover, Saleh *et al*. QLB and TAP block comparison for perioperative analgesia in patients experiencing open nephrectomy and revealed that, in comparison to QLB block, postoperative MAP and HR were significantly higher in TAP. They concluded that for patients having a nephrectomy with a flank incision, QLB offers more effective perioperative analgesia than posterior TAP block.

Concerning side effects, (hematoma, LAST, PONV). The three groups did not differ significantly from one another. In line with our results, Jadon *et al*. [19] found that there was no significant change in PONV between QLB and TAP in women who were going to have a CS. Also, Liu *et al*. [34] found that Patients having abdominal surgery did not show a statistically significant difference in PONV between the QLB and TAP block. On the same context Wang *et al*. [35] compared six anesthetic technique (TAP, ESPB, QLB, LWI, ilioinguinal and Ilio hypogastric block) for postoperative analgesia in CS and they found no side effects with all blocks.

In our study regarding to patient satisfaction, it was significantly better in QLB than TAP and LWI and was significantly better in TAP than LWI. In accordance with our results, Jadon *et al*. [19] found that Compared to TAP, QLB had a statistically significant higher level of patient satisfaction. Also in agreement with our results, Mohamed *et al*. [31] found that there was a statistically highly significant of patient satisfaction in QLB than in TAP as opposed to our outcome Tawfik *et al*. [29] found that there was an insignificant difference between TAB block and wound Infiltration in patient satisfaction.

Limitations include that the block wasn't performed pre-emptive before skin incision, duration of anaesthesia was different in the three studied groups because of shorter time of performing LWI than ultrasound-guided block techniques (QLB, TAP) and this may affect analgesia duration, no additives were incorporated with bupivacaine to detect their impact on duration of postoperative analgesia, and higher number of patients were required for more documentation of the efficacy of QLB. The concurrent study recommends using ultrasound guided QLB for opioid-sparing postoperative analgesia in patient undergoing hysterectomy. Also, it is advised to do more research utilising ultrasound guided QLB in various volumes to ascertain the ideal volume (dose). Further studies using additive are recommended in different doses in combination with bupivacaine as fentanyl, dexmedetomidine and dexamethasone to improve the duration and efficacy of TAP and LWI. Future research can examine the use of continuous catheters for continuous analgesia.

Conclusions

QLB outperformed Ultrasound-guided TAP block and LWI in managing postoperative pain after abdominal hysterectomy. This superiority was shown in terms of pain score, total morphine use, duration of pain relief and time of first request for pain relief.

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