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A comparative study between the analgesic effects of ultrasound guided bilateral ilioinguinal / iliohypogastric nerve block and bilateral transverses abdominis plane block after caesarean section: A Randomized control clinical trial

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Abstract

Objectives: The aim of this work was to contrast the analgesic effect of sonar guided Ilioinguinal/Iliohypogastric nerve (IL) block and Transverse abdominis plane (TAP) block after CS.

Methods: This randomized control clinical trial had been conducted on 90 adult participants ranging in age from 21 to 35 years old with ASA II undergoing CS. Patients were allocated in three groups equally. Group I (Control Group) obtained spinal anesthesia only, Group II (Ilio-Inguinal Ilio Hypogastric (IL-IH) nerve block) received spinal anesthesia with bilateral ultrasound (US) IL- IH nerve block (After skin closure (Total 20ml bupivacaine 0.25%) for each side and Group III (TAP block) received spinal anesthesia with bilateral US TAP block (After baby delivery & skin closure) (Total 20 ml bupivacaine 0.25%) for each side.

Results: VAS was insignificantly different at 2 and 24 hr. among the three groups but was significantly different at 6, 12 and 18 hr. across the three groups (P value <0.001). VAS was significantly lower at 6 and 18 hr. in (ILIH group and TAP group) contrasted to in Control group (P value <0.001). It was insignificantly varied between ILIH group and TAP group. At 12 hr. it had been significantly higher in ILIH and TAP groups than in control group (P value <0.001) and it was significantly lower in TAP than ILIH group (P value <0.001). Time to 1st rescue analgesia was 6±0 in spinal group, 12±0 in ILIH group and 12±0 in TAP group. A significant increase in analgesic use existed in control & IL-IH groups compared to TAP group.

Conclusions: US guided IL-IH block is an analgesic substitute method to TAP block in female participants having cesarean section. Similar analgesic use, haemodynamic stability, and drug-related side effects were seen between the two blocks.

Keywords: Sonar guided, transverses abdominis plane block, ilioinguinal /iliohypogastric nerve block, caesarean section, ultrasound

Introduction

Caesarean section (CS) is globally among the most conducted surgical procedures, especially in Egypt where it's considered the 3rd among world countries performing it [1], Although WHO recommends performing it only, when necessary, some are performed without medical reasons or maternal request [2, 3].

The postoperative pain following CS is regarded to be of mild to moderate severity that lasts for a maximum of 72 hours. Left uncontrolled acute pain resulted in the emergence of chronic pain, extended hospital stays, and impaired breastfeeding [4, 5].

The rate of using regional anesthesia in CS, especially spinal anesthesia, has been increasing to prevent fetal exposure to depressive medication and to permit mother to stay awake throughout delivery [6]. Consequently, it became the most preferred anesthetic technique in CS [7]. Ultrasound-guided intervention (US guided) ilioinguinal/iliohypogastric nerve (IL) block is a commonly used method of postoperative pain relief for lower abdominal procedures, particularly for postoperative pain after CS and for analgesics for individuals of various age groups having hernial surgery. It has also been associated with decreased risk rate of intraneural, intravascular, and intraperitoneal injection [8].

US guided transverse abdominis plane (TAP) block is a localised analgesic treatment used for post-operative pain management after lower abdominal procedures.

Abundant research has shown that it decreases the use of opioids after surgery and the adverse consequences linked to opioids. This peripheral nerve block is specifically intended to induce anaesthesia in the nerves that provide stimulation to the anterior abdominal wall (T6 to L1). The approach was first documented in 2001 by Rafi as a conventional blind landmark method that use the lumbar triangle of Petit [9].

The purpose of this work was to contrast the analgesic effect of US-guided IL nerve block and TAP block after CS.

Methods

This work had been conducted from January 2021 to January 2022 on 90 adult participants ranging in age from 21 to 35 years old with ASA II undergoing CS, following approval from the Ethics Committee Tanta University Hospitals, Egypt (approval code: 34567/3/21). Each subject provided well-informed written consent.

Criteria for exclusion were patient's refusal, emergency C.S, neurological / psychiatric disorder, local infections at the injection site, allergies to local anesthetics, coagulopathy and BMI > 35.

Randomization and blindness

The study randomization was done by employing computer-generated random numbers, participants had been assigned in three equal groups Group I (Control Group) received spinal anesthesia only, Group II (Ilio-Inguinal Ilio Hypogastric (IL-IH) nerve block) received spinal anesthesia with bilateral US IL-IH nerve block (After skin closure (Total 20ml bupivacaine 0.25%) for each side and Group III (TAP block) received spinal anesthesia with bilateral US TAP block (After baby delivery & skin closure) (Total 20ml bupivacaine 0.25%) for each side. Allocation had been conducted employing a sealed opaque envelope with blind chief nurse who didn't participate with study or data collection. Open the envelope and determine group assignment for each patient. All parameters & outcomes were recorded & followed up by additional anesthesiologist who is blind to the group assignment.

Anesthetic techniques Pre-operative

All patients were clinically examined in the preoperative period and the whole procedure was explained to them. At that time, they were introduced to a 10-point visual analogue scale; with 0 as no pain & 10 as the worst pain one can imagine.

Intra-operative

After completion of the fasting hours and arrival in the operating room, conventional monitoring had been employed, involving non-invasive blood pressure every five minutes, continuous heart rate (HR) monitoring using ECG, and pulse oximeter. An IV lactate ringer's solution infusion had been initiated. Spinal anaesthesia utilizing strict aseptic technique- with localized lidocaine 2% 2 ml infiltration before placing the spinal needle, spinal blockade was performed with 25 conventional spinal needles with participant in sitting posture via midline technique, utilising 2 ml (10mg) bupivacaine 0.5% and 25 mg fentanyl.

Immediately following the blockade, the participant had been advised to switch with left lateral tilt & the level of blockade was measured. After baby delivery & skin closure block was performed according to patient group either group II or group III.

IL-IH nerve block technique: A linear sonoscape US (SN: 0725451194) probe was introduced online from the umbilicus to the anterior superior iliac spine, the three muscles " internal oblique (IO), external oblique (EO), and transversus oblique (TO)" are identified and the ilioinguinal nerve was identified.

The iliohypogastric nerve (IH): Enter the posterior part of the transversus abdominis between the tranversus abdominis and internal oblique it splits into anterior and lateral cutaneous branches and the IH nerve was injected between these muscles. A total volume of plain bupivacaine (Total 20ml bupivacaine 0.25%) 10 ml for each nerve is introduced with blunt 22G needle that's after -ve aspiration using the in-plane technique after a distinct pop feeling. Similar procedure will be executed on the opposite side.

TAP block technique

A linear sonoscape probe (SN: 0725451194) was introduced in anterior axillary line; halfway between costal margin and iliac crest, thNext, proceeded towards the navel till each of the muscles "EO, IO, and TO" was identified (Figure 1).

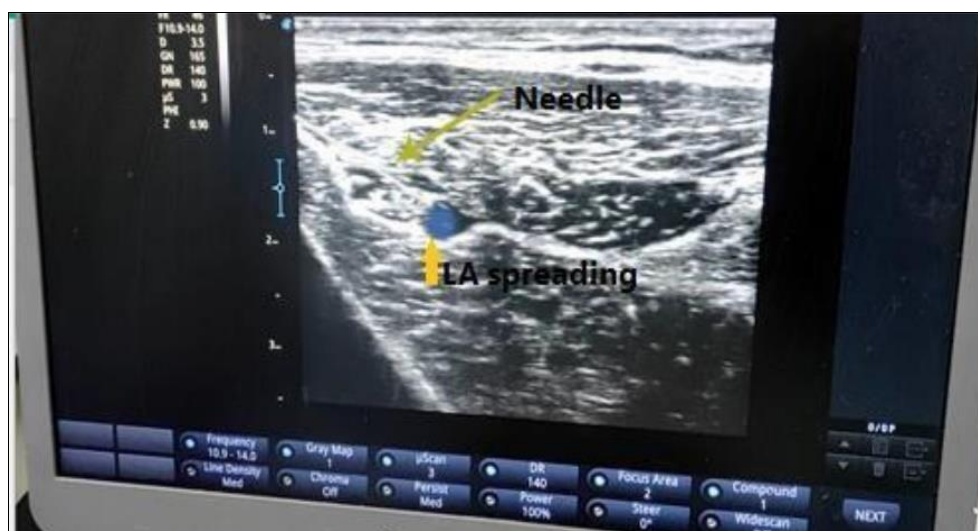


Fig 1: U/S picture showing Ilio inguinal ilio hypogastric nerves after injection of local anesthetics

Then a total volume of plain bupivacaine (Total 20ml bupivacaine 0.25%) is introduced with 22G needle after –ve aspiration in the line between the IO and transversus abdominus muscles using the in-plane technique after a

distinct pop feeling. (Figure 2). Similar procedure will be executed on the opposite side Figure 3, Figure 4.

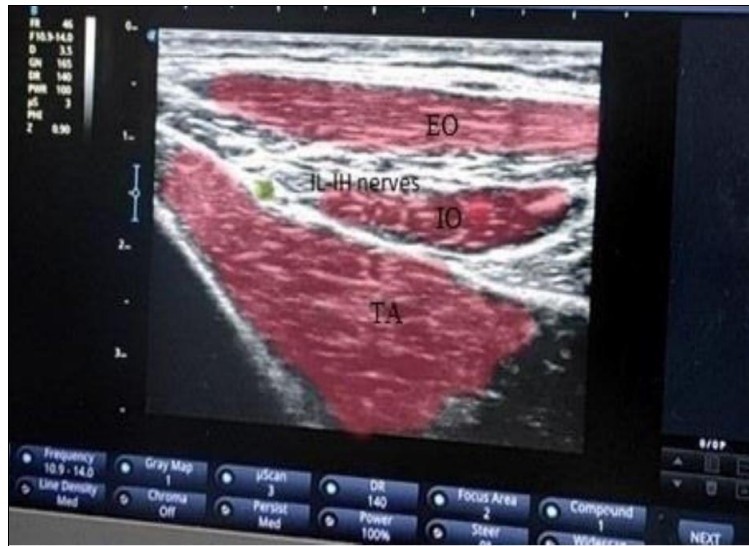


Fig 2: U/S picture showing three abdominal muscles & IL-IH nerves. EO: external oblique. IO: internal oblique, TA: Transversus abdominus

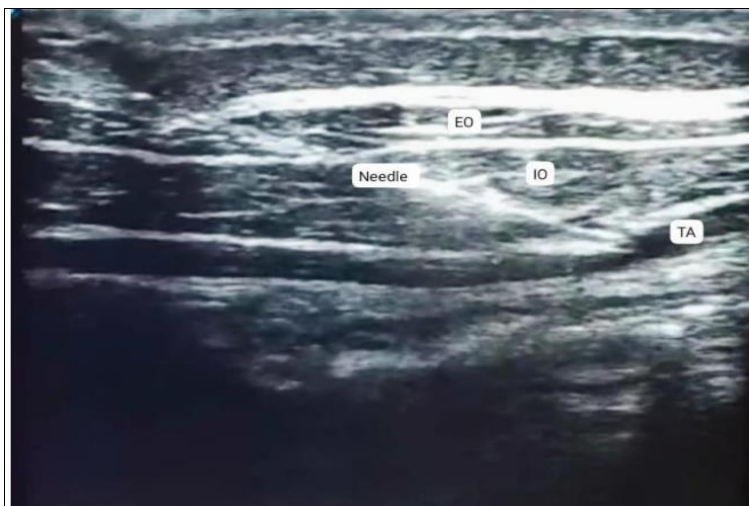


Fig 3: U/S picture showing three abdominal muscles with needle penetrating required plane. EO: external oblique. IO: internal oblique, TA: Transversus abdominus

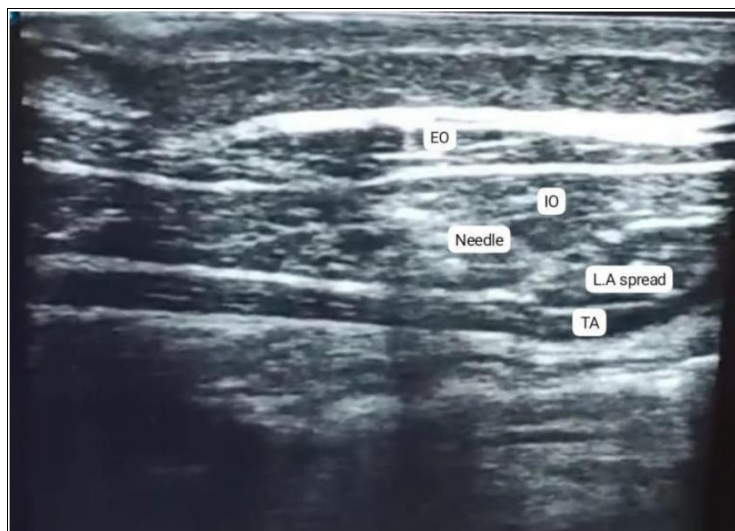


Fig 4: U/S picture showing L.A. spreading through required plane, IO: internal oblique, EO: external oblique. TA: Transversus abdominus

Postoperative management

Postoperative pain will be evaluated using Visual Analogue Scale (VAS) when “no pain” on the left end (0) of the scale and the “worst pain” on the right end of the scale [10].

All patients will be on 75 mg diclofenac immediately post-operative, then every eight hours. Rescue analgesia in the form of 0.5 mg/kg Pethidine IV will be given when VAS scale is ≥ 4 .

Measurements and monitoring

Mean arterial blood pressure and HR had been recorded preoperative, at 5 minutes, 15 minutes, 30 minutes & at the end of the operation. Pain score according to VAS will be assessed on admission to PACU, at 1h, 2h, 6h, 12h, 18h and 24h postoperative. The time to the first rescue analgesic administration. Total dose of rescue analgesics. Number of participants that needed rescue analgesic.

The primary outcome was post-operative pain in the 1st 24 hours. The secondary outcomes were time to use 1st rescue analgesic drug, total analgesic consumption of analgesic drug at 24 hours and number of patients needing rescue analgesic.

Sample Size Calculation

The sample size has been established with the Epi-Info software statistical tool, version 2002, developed by the World Health Organisation and Centre for Disease Control

and Prevention in Atlanta, Georgia, USA. The parameters employed in the computation of sample size had been as follows: At a 95% confidence level, with an 80% power of the research, the anticipated difference in postoperative pain levels across the three groups is around 20%.

Statistical analysis

Statistical analysis had been conducted employing SPSS v26 (IBM Inc., Chicago, IL, USA). Quantitative parameters had been displayed as mean and standard deviation (SD) and contrasted among all groups employing ANOVA (F) test with post hoc test (Tukey). Qualitative parameters had been displayed as frequencies and percentages (%) and had been analysed employing the Chi-square test. A two tailed P value < 0.05 was considered statistically significant.

Results

Ninety-eight patients were assessed for enrolment in the study; eight of them were excluded, as three individuals didn't match the criteria for inclusion, and five individuals refused to take a part in the work. Among the remaining ninety individuals, 30 were randomly assigned to each of the three groups equally. All ninety individuals were monitored and subjected to statistical analysis. Figure 5 The demographic data including age, weight and height were insignificantly different among the three groups (P= 0.555, 0.584, 0.373respectively). Table 1

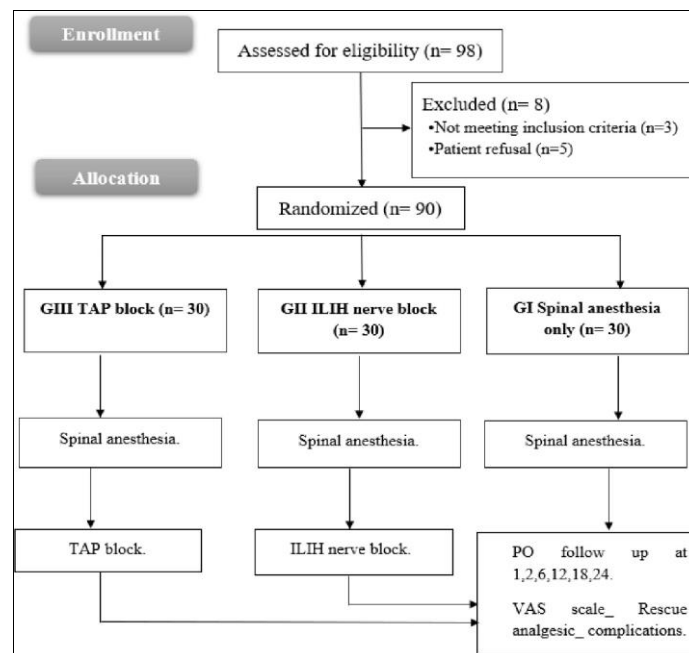


Fig 5: Flow Chart

Table 1: Comparison between the three studied groups depending on demographic features p. value

Age	Spinal	26.00±2.72	0.555
	ILIH	26.23±2.88	
	TAP	26.77±2.79	
Weight	Spinal	83.67±4.34	0.584
	ILIH	83.67±6.00	
	TAP	82.43±5.42	
Height	Spinal	163.57±4.99	0.373
	ILIH	161.77±4.96	
	TAP	163.13±5.50	

Data are presented as Mean±SD, * statistically significant (P ≤ 0.05), TAP: Transverse abdominis plane, ILIH: Ilio-Inguinal Ilio Hypogastric.

VAS was insignificantly different at 2 and 24 hr. among the three groups was significantly different at 6, 12 and 18 hr. across the three group (P value <0.001). VAS had been significantly lower at 6 and 18 hr. in (ILIH group and TAP

group) contrasted to in Spinal group (P value <0.001) and was insignificantly varied among ILIH group and TAP group. VAS was significantly lower in TAP group contrasted to in ILIH group (P value <0.001). Figure 6

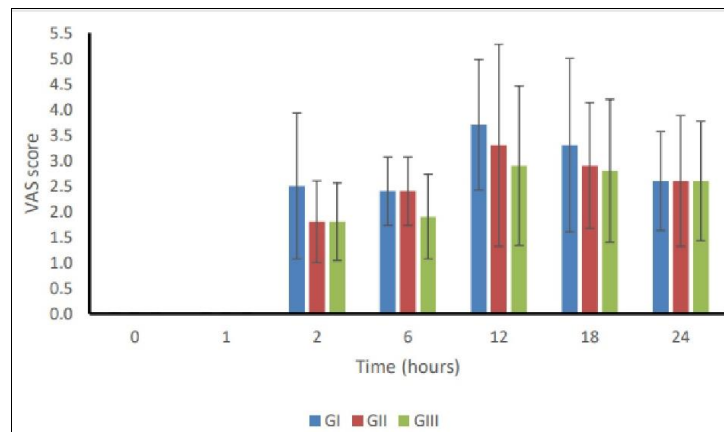


Fig 6: Comparison between VAS score changes among three groups VAS: Visual analogue score

Time to 1st rescue analgesia was 6±0 in spinal, 12±0 in ILIH and 12±0 in TAP. There’s a significant increase in analgesic consumption in spinal & IL-IH groups compared

to TAP group. Regarding the number of patients needing analgesic rescue there’s a significant increase in both spinal & IL-IH group (P value=0.001). Table 2

Table 2: Time to 1st rescue analgesia, comparison of total dose of postoperative analgesic among three groups and number of patients needing analgesic rescue

		Mean± SD		F. Test	P-value	
Time to 1 st rescue analgesia	Spinal	3.3±0.8		271.997	<0.001*	
	ILIH	14.8±3.33				
	TAP	15.8±2.62				
		Mean± SD		P-value		
Total Pethidine consumption (mg)	Spinal	83.00±5.35		0.001*	P 1	0.001*
	ILIH	54.00±20.27			P 2	0.001*
	TAP	51.00±16.26			P 3	0.45
		YES		NO		
Number of patients needing rescue analgesia	Spinal	30	100%	0	0%	
	ILIH	16	53%	14	47%	
	TAP	13	43%	17	57%	

Data are presented as Mean± S.D, N: Number. %: Percentage, * statistically significant (p≤ 0.05), TAP: Transverse abdominis plane, ILIH: Ilio-Inguinal Ilio Hypogastric.

Discussion

The TAP block (TAPB) is a localised analgesia method used for post-operative reduction of pain after lower abdominal procedures. Multiple studies have shown that TAPB decreases the use of opioids after surgery and limits the adverse effects correlated with opioids. An alternative method of post-operative pain relief for lower abdominal procedures is the IHINB (IHINB) [10].

In this work, intra/post-operative HR/MAP, VAS score, pethidine consumption was significantly varied among the three groups.

The analgesic impacts of bilateral ILIHB versus transverses abdominis nerve block for parturient undergoing elective CS was studied by Sileshi Abiy, Nugusu Ayalew [11] they concluded that both II-IHB and TAPB had similar analgesic efficiency throughout the first day. TAPB had more analgesic efficacy than II-IHB, with a 48-hour duration of action.

The effectiveness of IL-IH block & TAP block for analgesia after CS was studied by Bessmertnyj AE, Antipin EE [12] who showed that both nerve blocks enhance postoperative

pain relief following CS. Compared to the TAPB, the IHINB demonstrated superior effectiveness.

For the analgesic effect of ultrasound guided IL-IH & TAP blockades in CS Jin, Yulu & Li, [13] found that the effectiveness of TAPB and IHINB in providing adequate post-operative pain relief and lowering morphine use for mother females after caesarean section was similar. However, IHINB showed superior results 24 hours after the operation. Comparison between IL-IH & TAP block using bupivacaine & dexamethasone in CS s was studied by Mahmoud Alalfy [14], Nihal M. El-Demiry demonstrated that Analgesia after caesarean section is more effectively achieved with IL-IHB than TAPB.

Comparison between TAP block & spinal morphine was studied by Ben Marzouk S, Bennisr L [15] who reported that TAP block and intrathecal morphine were of similar efficiency for pain relief following CS. The incidence of side effects was comparable in both groups.

Jin ya, [13] found that following CS, TAPB and IHINB had a similarly effective analgesic impact. For the analgesic impact of TAP block on women undergoing CS Mankikar

MG, Sardesai SP ^[16] reported that TAP block reduced VAS significantly & prolonged the time for rescue analgesia. Yetneberk T, Chekol B, ^[17] stated that either strategy may be considered by the practitioner for post-CS management of pain.

This study recommended using US guided TAP block in patients undergoing CS, additional studies including a large number of patients were required for generalization of these results, further studies to assess adding bupivacaine in different concentrations by US guided TAPB and IL-IHB and further studies using sedative and additive in different doses in combination with bupivacaine in US-guided TAPB and IL-IHB.

Limitations

- -It was a single-center study, and the results may differ elsewhere.
- -A control group was not included due to ethical issues.

Conclusions

US guided IL-IH block is an analgesic substitute method technique to TAP block in female individuals having cesarean section. Similar analgesic use, hemodynamic stability, and drug-related adverse consequences were seen in both blocks.

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Conflicts of interest: There are no conflicts of interest.

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