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Unilateral Versus Bilateral Ultrasound Guided Tap Block Effect on Postoperative Pain Control in CS

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ABSTRACT

Background: Ultrasound-guided blocks of the transversus abdominis plane (TAP) can be used for following surgery pain relief during abdominal surgeries and caesarean sections (CS) as well.

Aim of study: Our goal was to study the difference in the efficiency of ultrasound-guided unilateral and bilateral TAP blocks as a postoperative analgesia for CS. **Patients and Methods:** In a randomized study, 100 pregnant women undergoing elective CS were split into 3 groups: Group I (the control group), no TAP blocks were administered, group II, 40 ml of bupivacaine 0.25% (100 mg) was administered to the RT side only and group III, 20 ml of bupivacaine 0.25% (50 mg) was administered to both sides.

Results: No discernible distinctions could be found between groups II and III regarding postoperative visual analogue scale (VAS), post-anesthetic care unit time and the total amount of opioid consumption ($P > 0.05$). But, a substantial distinction existed between the control group and the other two groups in postoperative VAS, post-anesthetic care unit time and the total amount of opioid consumption

Conclusion: With ultrasound-guided TAP blocks, efficient postoperative pain relief in CS may be obtained, however there was no variations between unilateral and bilateral TAP blocks in this regard.

Keywords: CS, TAP block, Ultrasound-guided.

INTRODUCTION

The anterior branches of the thoracolumbar ventral rami may be precisely targeted for local anesthesia injection using ultrasound-guided regional anesthesia, effectively preventing the patient from feeling pain or other somatic feelings in the abdomen wall [(1)]. We discovered that the TAP block is particularly useful for alleviating abdominal wall pain because it allows for the identification of both the sensory (abdominal wall) and the visceral (organ) origins of pain [(2)].

However, the first description of TAP block guided by ultrasound (US) was made anterior to the petit triangle, between the iliac crest and the subcostal border, using an in-plane technique in the mid-axillary line [(3)].

Transducers with a high frequency range are recommended. It is advised to pre-scan the midaxillary line of the patient's abdomen in order to determine the optimal angle for viewing all three layers of abdominal muscle prior to the procedure. As the external oblique muscle enters the rectus sheath via an aponeurosis, we need to be wary of the possibility that more medial scanning will only reveal two layers of muscles [(4, 5)].

By proceeding from the most superficial to the deepest layers of tissue, one comes into contact with the following: the skin, the subcutaneous fat, the external obliques, the internal obliques, and the transversus abdominis muscles, as well as the fasciae that surround each of these muscles. The transversus abdominis muscle and the fasciae that surround it are located farther into the abdominal cavity than the peritoneum and the bowels, both of which may be distinguished from one another based on the unique peristaltic motions that they exhibit. A layer of preperitoneal fat may be seen in the abdominal cavity in between these two layers of tissue [(6)].

Because of their comparatively hypoechoic nature and the many striations they contain, muscles may be separated from the surrounding tissue in ultrasound pictures. This is possible owing to the fact that muscles include a lot of striae. On the other hand, fascial layers have a more white-appearing appearance and are frequently referred to as hyperechoic layers [(7)].

PATIENT AND METHODS

This study was prospective, paired-comparison, identity-blinded, and randomized study. The study only included volunteers for CS treatments between the ages of 20 and 40 years, and 99 participants were assigned randomly to one of the three groups using the closed envelope method.

The sham control group (Group I) did not receive any TAB blocks. After sealing the skin, participants in group II received a unilateral TAB block with 40 ml of bupivacaine 0.25% administered only on the right side, while those in group III received a bilateral TAB block with 20 ml of bupivacaine 0.25% administered on each side after sealing the skin.

Exclusion criteria: Participants with a history of liver or kidney failure, diabetes, hypertension, cardiovascular dysfunction, bronchiolar asthma, chronic obstructive pulmonary disease, hematological illness, or obesity were excluded from the study.

The study recorded the age, body mass, and surgical times of all research participants throughout the clinical trial.

Anesthetic management:

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Standard monitoring procedures (electrocardiogram, pulse oximetry, noninvasive blood pressure, and capnography) were initiated prior to the induction of anesthesia.

All patients received the spinal anesthetic technique: All patient received spinal anesthesia with 2.5 ml heavy marcain (5 mg/ml).

All precautions of back sterilization done before induction of spinal anesthesia. The local anesthetic was prepared by an anesthesiologist who was not participating in the trial and who was unaware of the patients' assignment numbers.

An uninvolved anesthesiologist monitored all of the vitals throughout the entire procedure. One anesthetist handled all of the procedures.

The amount of time that passed between when the patient's sensations were completely blocked and when they began to complain of pain or discomfort was measured using a VAS to establish length of time of the sensory block (VAS) [14] (VAS>3) ranged from 0–10.

Assessment of postoperative pain was performed during follow-up visits in the operating room and the postoperative ward (using VAS) at the following intervals; 1, 2, 4, 6, 9 and 12 hours postoperatively.

All cases received postoperatively IV paracetamol 1 gm daily at 8-hour intervals throughout the first postoperative day [7].

Sample size:

The VAS for pain assessment was the primary outcome of this study, with a 95% confidence interval and 80% test power. Past research has shown that a minimum of 25 instances per group are necessary to show visible differences in terms of statistics in the VASs. In total, we included ninety instances in our analysis (30 in each of three groups).

Ethical Approval: The study was approved by the Ethics Board of Benha University and the patients were given all the information they need about the trial. An informed written consent was taken from each participant in the study. This work has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Statistical analysis

SPSS (Standard Version 21) of the Statistical Package for the Social Sciences was used to analyze the data collected. A one-sample Kolmogorov-Smirnov test was performed to check for data normality. Quantitative and percentage descriptions were used for qualitative information. If the data were regularly distributed, the continuous variable's mean and standard deviation were displayed, whereas if the data were not normally distributed, the median (Middle) value was shown.

RESULTS

According to the data, the average ages were 29.7 years for group 1, 26.7 years for group II and 27.8 year for group III. The analysis of variance (ANOVA) revealed that the difference was not substantial (F= 0.68, P=0.5). The average body weight for group I was 67.4, for group II it was 68.7, and for group III it was 68.5 years. There was no statistical significance found (F-test = 0.25, P = 0.43) as shown in table (1) and figure (1).

Table (1): Demographic characteristics of patients (mean ± SD)

	Group I	Group II	Group III	Test of significance	p- value
AGE	29.7±12.5	26.7±8.1	27.8±8.8	0.68	0.5
Weight	67.4±5.5	68.7±9.7	68.5±6	0.25	0.77

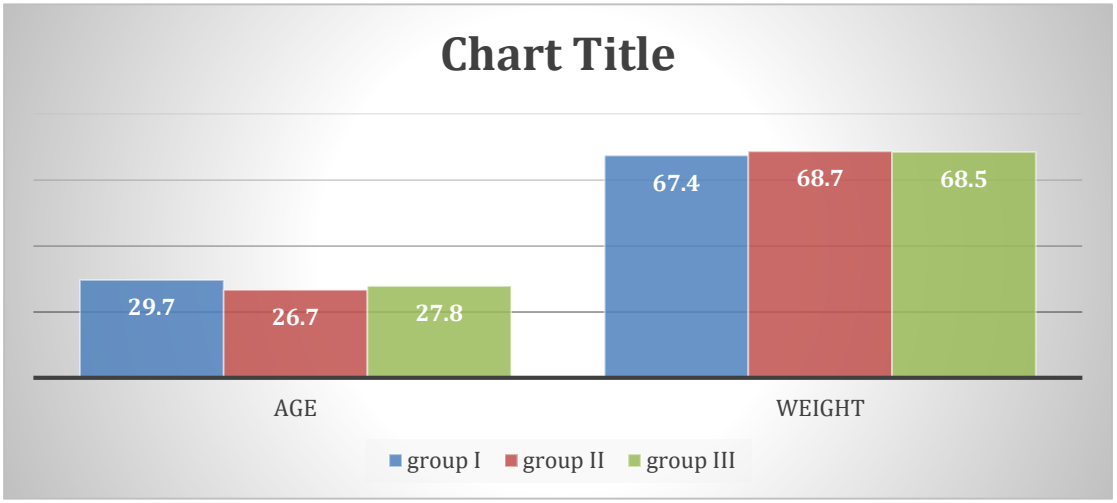

Figure (1): Comparison between age and weight in the 3 studied groups as regard to mean.

An ANOVA was performed to determine whether there were any substantial variation in the postoperative VAS scores among the three groups .

The results showed that **at 2 hours** postoperatively, there was no statistically substantial variation in the VAS scores for group I (2.4 ± 0.72), group II (2.7 ± 0.65), and group III (2.3 ± 0.59) (F-value = 2.8, P-value = 0.06), with group I having a slightly higher score than the other two groups.

However, **at 4 hours** postoperatively, there was a substantial variation in the VAS scores for group I (5.5 ± 0.5), group II (5.6 ± 0.49), and group III (2.6 ± 0.56) (F = 325.8, P 0.001).

Similarly, **at 6 hours** postoperatively, there was a substantial variation in the VAS scores for group I (5.6 ± 0.49), group II (5.5 ± 0.57), and group III (2.7 ± 0.52) (F = 284.7, P 0.001), with group I having a greater score than the other two groups.

At 9 hours following surgery, there was also a substantial variation in the VAS scores for group I (6.4 ± 0.56), Group II (6.0 ± 0.55), and group III (3.6 ± 0.6) (F = 199.2, P 0.001), with group I having a greater score than group II and group III.

Finally, **at 12 hours** following surgery, there was a substantial variation in the VAS scores for group I (6.9 ± 0.67), group II (7 ± 0.58), and group III (3.7 ± 0.8) (F = 199.6, P = 0.002) (Table 2 and figure 2). VAS scores at 12 hours following surgery). Overall, the results indicated that group I had the highest VAS scores at all time points, followed by group II, and then group III.

Table 2: Assessment of Groups Using Postoperative Visual Analog Scale

VAS	Group I	Group II	Group III	F value	p- value
1 hour (postop.)	1.7±0.75	1.8±0.77	1.7±0.65	0.52	0.6
2 hrs.	2.4±0.72	2.7±0.65	2.3±0.59	2.8	0.06
4 hrs.	5.5±0.5	5.6±0.49	2.6±0.56	325.8	<0.001
6 hrs.	5.6±0.49	5.5±0.57	2.7±0.52	284.7	<0.001
9 hrs.	6.4±0.56	6±0.55	3.6±0.6	199.2	<0.001
12 hrs.	6.9±0.67	7±0.58	3.7±0.8	199.6	<0.002

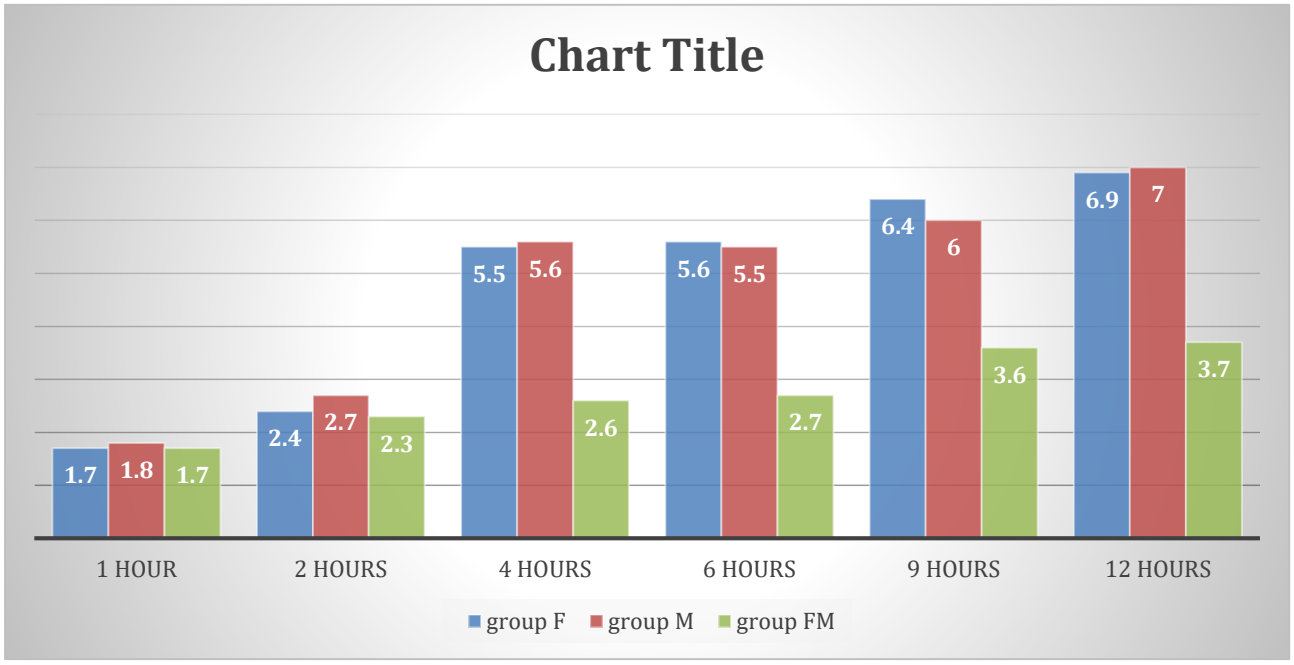

Figure (2): Comparison between the 3 groups as regard to mean of VAS score.

DISCUSSION

In this study, 99 patients prepared for elective Cesarean section were assigned randomly to one of 3 groups: placebo, active treatment, or observation. Group I was the control group and did not receive a TAP block, while group II received 40 ml of bupivacaine 0.25% (100 mg) on the right side and group III received 20 ml of bupivacaine 0.25% (50 mg) on each side.

The primary aim of this prospective, randomized, double-blind, controlled investigation was to assess and compare the efficiency of ultrasound-guided TAP blocks administered bilaterally versus unilaterally for following surgery pain treatment in cesarean section patients.

The analysis of variance (ANOVA) reported that there was no statistical substantial variation in age between group I (29.7 years) and group II (26.7 years) compared to group III (27.8 years), with an overall median age of 27.8 years (F = 0.68, P = 0.5). Similarly, there was no substantial variation in weight between group I (67.4 kg), group II (68.7 kg), and group III (68.5 kg) (F = 0.25, P = 0.43). Our findings were consistent with **Shin *et al.*** [8], the efficiency of ultrasound-guided TAP block as a preventative analgesic in patients having gynecologic operation via a transverse lower abdominal skin incision. The results of **Shin *et al.*** [8] indicated that ultrasound-guided TAP block was efficient.

Our study did not reveal a substantial age variation between the groups, which is in accordance with the results of **Hunter *et al.*** [9]**,** who investigated the feasibility of combining the TAP block with the free flap of abdominal tissue in breast reconstruction surgeries.

In this study, we utilized an ANOVA test to analyze the VAS scores of three groups following a standardized protocol. Our results showed that after one hour postoperatively, there was no statistical substantial variation in VAS scores between group I (1.7±0.75), group II (1.8±0.77), and group III (1.7±0.65), with an F = 0.52 and a P=0.6. Two hours postoperatively, the VAS scores for groups I, II, and III were 2.4±0.72, 2.7±0.65, and 2.3±0.59, respectively, with an F=2.8 and a P=0.06, which was not statistically substantial. However, after four hours postoperatively, there was a statistically substantial variation between the three groups, with group I having a VAS score of 5.5 ± 0.5, group II having a VAS score of 5.6 ± 0.49, and group III having a VAS score of 2.6 ± 0.56, with an F-value of 325.8 and a P-value of 0.001. At six hours postoperatively, the VAS scores for group I (5.6±0.49), group II (5.5±0.57), and group III (2.7±0.52) were statistically substantial, with F-values of 284.7 and P-values less than 0.001 for each group. Similarly, at nine hours postoperatively, the VAS scores were 6.4±0.56, 6±0.55, and 3.6±0.6 in group I, group II, and group III, respectively, with both the F= 199.2 and P=0.001 indicating a statistical substantial variation between the groups. Finally, one day after surgery, the VAS score for group I was 6.9±0.67, for group II was 7±0.58, and for group III was 3.7±0.8, with each group's F-value being 199.6 and the P-value being less than 0.002, indicating a statistically substantial variation between the groups.

In our study, we conducted a statistical analysis of the efficiency of a TAP block in delivering postoperative analgesia to patients undergoing inguinal hernia surgery. Our results are consistent with the findings of **Venkatraman *et al.*** [10], who investigated the same topic using ultrasound guidance. We aimed to assess the efficiency of the TAP block in reducing pain after inguinal hernia surgery. We observed a substantial variation in VAS pain ratings between the groups at 4 and 12 hours post-surgery, which may be due to the age disparity between the groups.

The safety and effectiveness of utilizing a TAP block during laparoscopic ultrasound-guided transmural resection of the colon were investigated by **Zaghiyan *et al.*** [11] where they aimed to compare the outcomes of using the block versus not using it to determine which method was safer and more successful. However, our study did not agree with their findings, as we did not find a substantial variation in pain ratings between the groups on the Visual Analogue Scale for Pain.

CONCLUSION

After surgery, a TAP block guided by ultrasound provides effective analgesia in CS but there were no variations between unilateral and bilateral TAP blocks in post-operative analgesia in CS.

DECLARATIONS

- **Consent for publication:** I attest that all authors agreed to submit the work.
- **Availability of data and material:** Available
- **Competing interests:** None
- **Funding:** No fund
- **Conflicts of interest:** no conflicts of interest.

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