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Transverse Abdominis Plane Block For Management Of Postoperative Cesarean Section Pain

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ABSTRACT

Background: pain after Cesarean delivery (CD) can negatively affect ambulation, breastfeeding, and maternal bonding. The aim of this study was to determine whether a correctly performed TAPB can provide better control of acute postoperative pain during the first 48 hours after CS and if it can provide a faster postoperative recovery.

Patients and methods: included 32 participants who underwent elective caesarean section assigned randomly into two groups. Group A: 16 patients received TAP block. Group B: 16 patients did not receive any block. Medicine Ten centimeters visual analog scale (VAS) was also explained during preoperative visit. The postoperative pain was evaluated at 1, 2, 4, 8, 12, 18 and 24 hours by using VAS for pain scoring that was explained to the patients during preoperative visit as a 100 millimeter horizontal line with verbal anchors at both ends.

Results: Our study showed that there is statistically significant difference between the studied groups regarding VAS pain scorebaseline or at any point of time (significantly lower in TAP block group). In each group, there is significant change (increase) in VAS pain score over time. There is statistically significant difference between the studied groups regarding time for first analgesia (significantly longer in TAP block group). Number of patients who need nalufin was significantly higher in control group (ten patients within control group versus only one in TAP block group). Also, there is statistically significant difference between the studied groups regarding patient satisfaction. More than half of patients (56.2%) within TAP block group were very satisfied while half of those within control group felt neutral (neither satisfied or not).

Conclusion: Transverse abdominis plane block represents a viable alternative to common analgesic procedures performed for acute postoperative pain control after a CS.

Keywords: TAPB; Pain scoring system; Cesarean section

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1. INTRODUCTION

It's very important objective of postoperative pain management in obstetrics is minimizing the cumulative maternal opioid dosage to reduce maternal sedation and neonatal side effects according to The American College of Obstetricians and Gynecologists (ACOG) **[1]**.

Pain has both sensory and emotional components that interact to produce an overall pain experience. According to International Association for Study of Pain (IASP) pain is defined as unpleasant emotional and sensory experience due to actual or potential tissue damage or described in terms of such damage **[2]**. Unable to control postoperative pain after Cesarean delivery (CD) can negatively affect ambulation, breastfeeding, and maternal bonding **[3]**.

Systemic or neuraxial opioids are the mainstay for treating postoperative pain, as they are effective against both the components. However, they are associated with a number of undesirable side effects such as nausea, vomiting, pruritus, constipation, and respiratory depression **[4]**.

Nonsteroidal anti-inflammatory drug alone may be insufficient to treat postcesarean pain. Currently, multimodal analgesic technique involving abdominal nerve block with parenteral analgesics is becoming popular for these patients **[5]**.

Transversusabdominis plane (TAP) block is the thriving regional analgesia practice for postoperative pain management with significant outcome on assisting infant care, early ambulation, and hindrance of postoperative morbidity. TAP block analgesic technique can lower severity of pain, nausea and vomiting and paralytic ileus at post-operative period. It is also having in reduction of postoperative morbidity, duration of hospitalization and hospital costs **[6]**.

The aim of this study was to determine whether a correctly performed TAPB can provide better control of acute postoperative pain during the first 48 hours after CS and if it can provide a faster postoperative recovery.

2. PATIENTS AND METHOD

This study was a randomized clinical study included 32 participants who underwent elective caesarean section. Inclusion criteria were Elective cesarean section, maternal wellbeing, fetal wellbeing. While exclusion criteria were allergy to local anesthetics, skeletal and/or muscle abnormalities of the spine, primary and/or secondary neurological diseases, psychiatric diseases, history of chronic pain and/or neuropathic disorders, history of drug abuse, state of sepsis, Infection, and/or tumors within the skin on the back, primary or secondary coagulopathies, preeclampsia or eclampsia, an emergency caesarean section, Patients less than 50 kg, Patients more than 100 kg, Any contraindication to spinal anesthesia and who refuse to participate in the study.

The patients were assigned randomly into two groups. Group A: 16 patients received TAP block with 20 ml 0.25% bupivacaine. Group B: 16 patients did not receive any block. University approval of this study was obtained and approved by the Research Ethical Committee of Faculty of Medicine, Zagazig University. The work is carried out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

All patients were interviewed preoperatively during their preoperative preparation. The goal and endpoints of the studywere discussed. Understanding of the block were reviewed and emphasized, informed consent were taken. All Patients were kept fasting for minimum 68 hours before the operation. All Patients had the whole procedure explained. Ten centimeters

visual analog scale (VAS) (0 – no pain and 10 – worst pain imaginable) was also explained during preoperative visit

A wide band high frequency (5-13 MHz) linear array transducer was used (12 L-SC), GE Venue 40 point of care ultrasound machine (GE healthcare®) was used for all blocks. The blocks were performed using a 21-gauge (100 mm) SonoPlex® echogenic needles by Pajunk. All blocks were performed with the patients in the supine position, the skin at the site of the block was prepped with chlorhexidine antiseptic solution. Strict aseptic technique was used including sterile gloves, masks, overhead caps, sterile drapes and sterile ultrasound probe covers.

The ultrasound probe was placed in the midaxillary line of the side to be blocked, midway between the lower costal margin and the iliac crest. Scanning of the lateral abdominal wall was done by sliding the probe anteriorly and posteriorly to appreciate the three muscular layers forming the abdominal wall; from superficial to deep; external oblique, internal oblique and transversusabdominis. Special care was taken to identify the potential plane between the internal oblique muscle and the transversusabdominis and differentiate it from the deeper fascia transversalis that separate the muscles from the preperitoneal fat and peritoneum.

The TAP block under ultrasound is performed behind anterior axillary line between the iliac crest and the most inferior extent of the ribs. The plane between internal oblique and transversus is located around the anterior axillary line while the probe is positioned transverse to the abdomen. Normal saline was attached to the needle and used for hydrodisection till the tip of the needle is properly identified in the transversusabdominisplane between the internal oblique (superficial) and transversusabdominis (deep).

After negative aspiration, a 20 ml of bupivacaine 0.25% is injected in small increments over few minutes observing the spread dissection of the fluid between the two appropriate muscles. Patients were monitored for any neurological or cardiovascular symptoms or signs of local anesthetic toxicity during the injection.

Both spinal anesthesia and TAP block were done by same anesthesiologist

The postoperative pain was evaluated at 1, 2, 4, 8, 12, 18 and 24 hours by using the standard 10 cm visual analogue scale for pain scoring that was explained to the patients during preoperative visit as a 100 millimeter horizontal line with verbal anchors at both ends.
(6).

If VAS score exceeds 3 the patient will receive 5-10 mg of nalbuphine via IV route titrated according to the pain response and the time of the first dose required and the total amount needed will be recorded after 24 hours post-operative .

Data analysis was performed using the software SPSS (Statistical Package for the Social Sciences) version 20. Quantitative variables were described using their means and standard deviations. The level statistical significance was set at 5% ($P<0.05$). Highly significant difference was present if $p\leq0.001$

3. RESULTS

The current study sample was matched in age and sex and other baseline criteria as showen in table 1. There is statistically non-significant difference between the studied groups regarding systolic blood pressure baseline or at any point of time. In each group, there is significant change (fluctuation) in systolic blood pressure over time.

Also, there was statistically non-significant difference between the studied groups regarding diastolic blood pressure baseline or at any point of time. In each group, there is significant change (fluctuation) in diastolic blood pressure over time.

Table (1): Comparison between the studied groups regarding baseline criteria

Parameter	Groups		Test	
	TAP block group	Control Group	χ^2 /t/Z	P
	N=16 (%)	N=16 (%)		
Age (year): Mean ± SD Range	 28.063 ±5.397 20 – 39	 27.438 ± 3.425 24 – 35	0.391	0.698
BMI (kg/m^2): Mean ± SD Range	 27.938 ±6.547 17 – 34	 26.875 ± 7.032 17 – 34	0.442	0.661
Gravidity: Median Range	 3.5 1 – 8	 3.5 2 – 8	-0.77	0.441
Parity: Median Range	 2 0 – 5	 2.5 0 – 5	-0.832	0.405
Abortion: Median Range	 0 0 – 2	 1 0 – 2	-1.148	0.251
Gestational age (weeks) Mean ± SD Range	 38 ± 0.894 37 – 39	 37.313 ± 2.845 37 – 39	0.922	0.364

χ^2Chi square test t independent sample t test Z Mann Whitney test

There is statistically significant difference between the studied groups regarding VAS pain score baseline or at any point of time (significantly lower in TAP block group). In each group, there is significant change (increase) in VAS pain score over time. (Table 2)

Table (2): Comparison between the studied groups regarding VAS

VAS pain score	Groups		Test	
	TAP block group	Control group	Z	p
	Median (range)	Median (range)		
In the first hour	0 (0)	0 (0 – 2)	-2.39	0.017*
In the second hour	0 (0)	0 (0 – 2)	-2.39	0.017*
After 4 hours	1 (1 – 2)	2 (1 – 3)	-1.989	0.047*
After 8 hours	2 (1 – 2)	2 (1 – 4)	-2.422	0.015*
After 12 hours	2 (1 – 3)	3 (2 – 5)	-3.077	0.002*
After 18 hours	3 (2 – 4)	4 (4 – 5)	-4.346	<0.001**
After 24 hours	3 (2 – 5)	5 (4 – 5)	-3.187	0.001**
P (F)	<0.001**	<0.001**		

F Friedman test Z Mann Whitney test
**p≤0.001 is statistically highly significant *p<0.05 is statistically significant

There was statistically significant difference between the studied groups regarding time for first analgesia (significantly longer in TAP block group). Number of patients who need tramadol was significantly higher in control group (ten patients within control group versus only one in TAP block group).

There was statistically significant difference between the studied groups regarding time for regaining bowl function (significantly shorter in TAP block group).

There was statistically significant difference between the studied groups regarding patient satisfaction. More than half of patients (56.2%) within TAP block group were very satisfied while half of those within control group felt neutral (neither satisfied or not). (Table 3)

Table (3): Comparison between the studied groups regarding patient satisfaction

Patient satisfaction	**Groups**		**Test**	
	TAP block group	**Control group**	χ^2	**p**
	N=16 (%)	**N=16 (%)**		
Very dissatisfied	0 (0)	0 (0)		
Dissatisfied	0 (0)	0 (0)		
Neutral	1 (6.2)	8 (50)	6.488	0.011*
Satisfied	6 (37.5)	4 (25)		
Very satisfied	9 (56.2)	4 (25)		

χ^2Chi square for trend test *p<0.05 is statistically significant

4. DISCUSSION

Managing pain following cesarean section is challenging. The analgesic regimen should be effective, safe, and devoid of side effects. Over recent years, there has been growing interest in regional nerve block techniques with promising results on efficacy, as they reduce the need of supplemental analgesia thereby lower the incidence of drug-related side effects. **[7, 8]**.

TAP block is a relatively new abdominal nerve block with excellent efficacy after a variety of abdominal surgeries including cesarean section **[9, 10]**.

Wijewardana and Jayawardane [11] showed on the TAP block which has been implemented to minimize systemic opioid drug complications as well as management of the postoperative pain effectively. TAP is a new, rapidly expanding regional anesthesia technique that provides analgesia to the parietal part of peritoneum as well as the skin and muscles of the anterior abdominal wall. It involves a single large bolus injection of local anesthetic into TAP anatomical compartment to block somatic afferent nerves on the anterior abdominal wall of T7 to L1 dermatomes.

The blind (appreciating double pop) TAP block technique has comparable effect to an ultrasound guided procedure which has been performed under direct vision. This type of block reduces the requirement of postoperative opioids use, increases the time for the first analgesic request, and provides helpful pain relief **[12]**

The aim of this study was to assess the efficacy of TAP block for CS delivery analgesia. In the current study, 32 participants were randomized into 2 groups: Group A included 16

patients receiving bilateral TAP block with 20 ml 0.25% bupivacaine and group Bincluded 16 patients not receiving any block.

Our study showed that there is statistically significant difference between the studied groups regarding VAS pain scorebaseline or at any point of time (significantly lower in TAP block group). In each group, there is significant change (increase) in VAS pain score over time. **Tarekegn et al. [13]** assessed the efficacy of TAP block procedure with bupivacaine local anaesthetic after Cesarean Section delivery. There was a different VAS score at each time intervals of 24 postoperative hours at rest.

But, like any study measuring pain as the primary outcome, we need to mention the limitation of the assessment tools to measure pain; VAS scores. Unfortunately, it is a subjective measurement that is affected by several individual factors, including social background, intellectual personality, previous experience of pain, etc. It is a unidimensional instrument, which is open to wide variation between subjects and within subjects at different times **[14]**

In our study, there is significant difference between the studied groups regarding percentage of patients within both groups who need acetaminophen after 24 hours (significantly higher in control group). While there is non-significant difference between them regarding need for acetaminophen after 8 or 12 hours. There is significant decrease in percentage of patients who need acetaminophen over time in TAP block group while there is non-significant change within control group. **Fusco et al. [15]** found that patients receiving USG-TAPB with local anesthetic commonly required acetaminophen to control their postoperative pain during follow-up.

There is statistically significant difference between the studied groups regarding time for first analgesia (significantly longer in TAP block group). Number of patients who need nalufin was significantly higher in control group (ten patients within control group versus only one in TAP block group).

Tarekegn et al. [16] showed the time from the end of surgery to the first analgesic request was significantly different between TAP and non-TAP groups ($p = 0.000$) at the postoperative period. The TAP block group showed as longer duration time for the first analgesic request than the controls with (mean ± SD) (286.00 ± 166.31) vs (76.25 ± 22.05) minutes, correspondingly. They concluded that bilateral TAP block provides lower postoperative severity of pain, reduced total postoperative Tramadol analgesics consumption and prolonged time for the first analgesic request after cesarean section under spinal anesthesia when it is used as multimodal analgesia.

In our study, there is statistically significant difference between the studied groups regarding time for regaining bowel function (significantly shorter in TAP block group). **Fusco et al. [15]** found that the time of recovery of bowel function was shorter in patients receiving USG-TAPB with local anesthetic.

In our study, there is statistically significant difference between the studied groups regarding patient satisfaction. More than half of patients (56.2%) within TAP block group were very satisfied while half of those within control group felt neutral (neither satisfied or not). **Fusco et al. [15]** stated that patient satisfaction was significantly different between the groups and confirmed that the correct performance of an USG-TAPB as part of a multimodal analgesic treatment could represent a viable alternative to common analgesic procedures performed for acute postoperative pain control after a CS.

This study observed analgesic benefit of TAP block when employed with standard postoperative analgesia after cesarean section done under spinal anesthesia. Predominant somatic pain was very well-relieved by TAP block and visceral pain at its worst did not appear to be prominent and was relieved by diclofenac. In our opinion, the TAP block has potential to

become an important tool in managing postoperative pain of cesarean delivery as it is easy to perform, is safe and has definite clinical utility.

Use of the TAP block supports the ACOG directive to explore non-narcotic methods of postoperative pain control after cesarean delivery. Women who could benefit most from the TAP block would be those who undergo cesarean under general anesthesia or who have medical contraindications to neuraxial narcotic administration. Such parturients may indeed minimize the significant side effects of repeated doses of intravenous narcotics. Moreover, upon completion of a well-designed longitudinal analysis it may be found that the modest reduction in postoperative oral narcotic dosage observed in the current study proves very beneficial to the maternal-child couplet. **[16]**

5. CONCLUSION

We can conclude that TAPB represents a viable alternative to common analgesic procedures performed for acute postoperative pain control after a CS. We recommend that TAPB should be included as part of multimodal analgesia in the postoperative period for women after Cesarean Section delivery

Conflict of Interest: No conflict of interest.

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