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Assessing the Analgesic Efficacy of Transversus Abdominis Plane Block after Cesarean Section Delivery under Spinal Anesthesia as Part of Multimodal Analgesia. A Prospective Cohort Study

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A B S T R A C T

Background: Pain is inevitable during surgery and pain management is the main issue in anesthesia and surgery. An ideal analgesic technique, offering pain-free treatment, free of side effects and cost-effective agent was needed to achieve good pain management. Therefore, this prospective study was conducted to evaluate efficacy of transverses abdominals plane block after Cesarean Section Delivery under Spinal Anesthesia as Part of multimodal analgesia among two comparative groups within 12 hours.

Objectives: To assess analgesic efficacy of transversus abdominals plane block after cesarean section delivery under spinal anesthesia at Zewditu Memorial Hospital from February to March 2016.

Methods: A prospective observation was done on 42 patients undergoing caesarean section delivery under spinal anesthesia. Those who undergo TAP block with bupivacaine (n=21) as exposed group and non-TAP (n = 21) with standard analgesia with intravenous agents were followed for 12 hours postoperatively. Each patient was observed post-operatively by an investigator for visual analogue score (VAS) at 2, 4, 6 and 12 hours, time to 1st analgesic request and total analgesic consumption within the first 12 postoperative hours were also recorded and compared to see effect of TAP. A data analysis was conducted by SPSS version 20.0 software. The mean and standard deviation of the comparative group was analyzed by using paired student's t -test. The significance difference was identified based on p-value less than 0.05.

Results: Postoperative VAS outcomes based for TAP group and non- TAP group include at 2 hours (5.23±3.34) vs (15.28±6.51), at 4 hours (7.09±3.11) vs (17.52 ± 3.9), at 6 hours (8.9±4.63) vs 21.04±5.06) and at 12 hours (11.33 ± 4.98) vs (25.2 ± 5.9). Tramadol consumption within the 1st 12 postoperative hours was 800 mg in TAP groups and 2350 mg in non-TAP groups. The TAP block group showed longer duration of time to 1st analgesic request than none TAP group (mean ± SD) (571.42 ±177.6) minutes vs (142.85 ± 48.28) minutes respectively. There was also decreased postoperative analgesic consumption and increased time to first request for analgesia in TAP group.

Conclusion and Recommendation: Patients with bilateral single injection of TAP block showed prolonged the time to 1st analgesic request, reduced total postoperative analgesic consumption and had lower postoperative severity of pain when compared with non TAP groups in patients after cesarean section under spinal anesthesia when it is used as part of multimodal analgesia. We recommend TAP block as part of multimodal analgesia after cesarean delivery. In addition, further study to find out the effect of TAP block after 12 hr.

Introduction

TAP block is simple to perform, and effective peripheral abdominal field block that blocks the lower intercostals (T7–T11), ilioinguinal, and iliohypogastric nerves. It is a modified technique in which the local anesthetic was injected in the neurovascular plane between the transverses abdominis muscle and internal oblique muscle of the anterior of the abdominal wall via the lumbar triangle of Petit [1].

Transversus Aabdominis Plane block technique involves injection of local anesthetic solution into a plane between internal oblique (IO) and transversus abdominis (TA) muscles. This plane contains the thoracolumbar nerves originating from T7 to L1 spinal roots which supply sensation to the anterolateral abdominal wall [2].

Transversus abdominis plane (TAP) block provided good postoperative analgesia, when used in patients requiring abdominal

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wall incisions for lower abdominal surgical procedures like lower segment caesarean section, prostatectomy, appendectomy, and laparoscopic surgeries [3,4].

Mostly postoperative pain relief was done by multimodal analgesia by using non-steroidal anti-inflammatory drugs (NSAIDs), Opioids and peripheral nerve blocks. Opioids were one of analgesic agents used for surgery in the perioperative period and were the only options before the development of peripheral nerve blocks [5,6]. But opioids were full of side effects like nausea, vomiting, constipation, urinary retention, respiratory depression and sedation. So other medications devoid of those side effects were needed for good pain relief without adverse effects [7,8]. Due to these non-opioid analgesic techniques were good for better pain management which avoided side effects associated with opioids. Local anesthetic agents, regional anesthesia and patient controlled analgesia were other alternatives of analgesia which made pain management very easy [9].

Sometimes TAP block may not have had adequate analgesia if not injected in the correct plane that means in the transverses abdominis plane which found between internal oblique muscle and transversus abdominis muscle. TAP block did not used to block visceral pain; it only blocked parietal pain [10]. Even if most of pain was raised from anterior abdominal wall. Local anesthetic could cause femoral nerve palsy during placement of the block using a "blind" technique [11]. This study was aimed at assessing the analgesic efficacy of TAP block as part of multimodal analgesia in terms of VAS, time to 1st analgesic request and total post operative analgesic in milligrams.

METHODS AND MATERIALS

Study setting and period

The study was conducted at Zewditu Memorial Hospital which is located in capital city of Ethiopia, Addis Ababa. It is one of the thirteen government hospitals found in Addis Ababa, which is under the control of Addis Ababa Health Bureau. The hospital primarily gave Cesarean section delivery services and delivers TAP block as pain management for patients. The study was conducted from February to march 2021.

Source population

All patients who undergone cesarean section delivery under spinal anesthesia at Zewditu Memorial Hospital during study period. Study population included selected TAP and non-TAP patients who undergone cesarean section delivery under spinal anesthesia.

Inclusion and Exclusion Criteria

Patients with decreased level of consciousness, patients who were discharged before the 1st 12 postoperative hours were excluded from the study.

Sample size and sampling procedure

The sample size (n) was determined on the basis of the mean 24 postoperative hours VAS scores of the cases and controls as calculated from the previous study with mean ± SD = (1.7±1.7 vs 3.1±1.5) mg, p< 0.05 respectively by using OpenEpi formula for comparison of mean [12]. The total sample size was 42. The number of TAP group 21 and the number of non-TAP group was 21. The total sample size was 42.

Data collection procedure

Structured questionnaires and check lists were prepared by the investigator. A total of 3 Anesthetists were participated in data collection process. Visual analogue scale, time to 1st postoperative analgesic request and total postoperative analgesic consumption data were collected post operatively to assess efficacy of analgesia in the postoperative 12 hours.

Data analysis and interpretation

Data was coded and entered to SPSS window version 20 for analysis. The outcome in both group was analyzed by conducting paired student t-test to see the mean difference in TAP and non-TAP groups. The significance mean difference was measured based on p-value less than 0.05. Tables and graphs were used for presentation of descriptive purpose.

Operational Definition

Transversus abdominals plane (TAP) block-is a peripheral nerve block designed to anesthetize the nerves supplying the anterior abdominal wall (T_7 to L_1).

Triangle of petit- The area on the lateral abdominal wall bounded by the iliac crust, the posterior margin of the external oblique muscle, and the lateral margin of the latismus dorsi muscle.

Visual analogue scale (VAS) - It is measured by instructing the patient to point to the position on the line between the faces to indicate how much pain they are currently feeling. The far left end indicates No pain and the far right end indicates Worst pain ever'.

RESULTS

Socio-demographic characteristics of the patients

During the study period 42 patients operated for cesarean section under spinal anesthesia were observed. In the observation 21 of them were those given bilateral TAP block and 21 were those managed by other systemic postoperative analgesic agents without TAP block. They had comparable demographic characteristics in age, sex, weight, height and body mass index (Table 1).

Variable	Cases(TAP)	controls	P value
Age	27.33 ±3.3	31±5.1	0.62
Weight	61.33±5.54	63.1±7.2	0.59
Height	165.76±6.04	169.2±8.4	0.57
BMI	22.21±1.79	21.9±1.9	0.15
ASA status I II	16 5	14 7	0.12

Table 1: Demographic characteristics of patients who undergo cesarean section under spinal anesthesia from February to march 2021.

Postoperative pain on VAS scores

The mean postoperative VAS outcomes for TAP group and non- TAP group was at 2 hr (5.23±3.34) vs (15.28±6.51), at 4 hr (7.09±3.11) vs (17.52 ± 3.9), at 6 hr (8.9±4.63) vs 21.04±5.06) and at 12 hr (11.33 ± 4.98) vs (25.2 ± 5.9) (Figure 1).

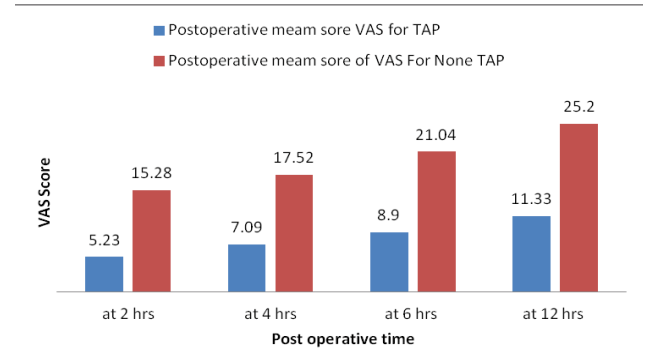

Figure 1: Mean postoperative visual analogue scale (VAS) scores at rest in each group over the first 12 hours at Zewditu Memorial Hospital Addis Ababa from February to March, 2021.

Postoperative analgesic consumption and time for the first analgesic request

Total Tramadol consumption within the first 12 postoperative hours was 800 mg in TAP groups and 2350 mg in non-TAP groups. Postoperatively the time from the end of surgery to the first analgesic request was significantly different between TAP and non-TAP groups. The TAP block group showed longer duration of time to first analgesic request than non-TAP group (mean ± sd) (571.42 ±177.6) minutes vs (142.85 ± 48.28) minutes respectively.

DISCUSSION

The results of this study showed that TAP block when used as part of multimodal analgesia after caesarean delivery under spinal

anesthesia showed 65% reduction in tramadol consumption during the first 12 postoperative hours. This was one of the indicators of analgesic efficacy of TAP block [13]. The result of this study was relatively higher as compared to with study done in India which showed that 50% reduction in tramadol consumption within the first 24 postoperative hours. The possible explanations for this variation might be either due to different pain threshold between these societies or variation in duration of postoperative follow-up. In India they were followed for 24 hours but here they were followed for 12 hours.

This study showed that total tramadol use within the first 12 postoperative hours in TAP and non- TAP groups was 800 mg and 2350 mg respectively. The total post-operative tramadol requirement was reduced in those with TAP block compared to those who did not take TAP [14]. This reduction by 65% in TAP group compared to non TAP groups indicated TAP block avoid increased opioid consumption and allowed early ambulation. So it is a cost effective and useful method which encouraged use of TAP block as part of multimodal analgesia [4,15,16].

TAP block resulted in decreased VAS score, delayed time for rescue analgesia and reduced requirement of opioid analgesic. Use of peripheral nerve blocks as part of multimodal analgesia made pain management effective and easy. TAP block has high contribution in pain management [17].

CONCLUSION and RECOMMENDATION

It is concluded that bilateral single injection of TAP block prolonged the time to first analgesic request, reduced total postoperative analgesic consumption and had lower postoperative severity of pain when compared with non-TAP groups in patients after cesarean section under spinal anesthesia when it is used as part of multimodal analgesia. It is better to use TAP block as part of multimodal analgesia after cesarean delivery. Further study should be conducted to find out the effect of TAP block after 12 hr.

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Conflict of Interest

The authors declare that there is no conflict of interest.

Ethical consideration

Ethical clearance was obtained from ethical review board of college of medicine and health sciences, Addis Ababa University department of Anesthesia. Official permission letter was obtained from Zewditu Memorial Hospital. Informed verbal consent was secured from each study participant. Confidentiality was insured by avoiding personal identifications, keeping questionnaires and checklists blocked.

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