Original Research Paper

Volume - 7 | Issue - 6 | June - 2017 | ISSN - 2249-555X | IF : 4.894 | IC Value : 79.96

Anaesthesiology

Assessment of analogous analgesic efficacy of transversus abdominis plane block by land mark technique after Cesarean Sections in rural population.

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ABSTRACT

Introduction: Women who have cesarean sections anticipate substantial pain and discomfort. They need to be mobile and observant early to cater to the needs of their newborn child. Traditionally, systemic drugs were used as adjutants to spinal, epidural or general anesthesia. Blocking the peripheral nerves is an alternative means of providing analgesia and thus reduce the need of systemic drugs and their dose related side effects.

The purpose of this article was to determine the corresponding analgesic efficacy of transversus abdominis plane (TAP) block by landmark technique after Cesarean Sections (CS).

Methodology: A randomized, double-blind, trial was performed at B.K.L. Walawalkar hospital, Dervan. 40 female parturient of ASA physical status I or II for cesarean section under spinal anaesthesia, were randomized to have a bilateral TAP block with 0.25% Ropivacaine (Group A = 20) or to undergo no block (Group B = 20) These patients in addition received standard analgesic comprising 75 mg Diclofenac 8 hourly. Each patient was assessed at 0, 2, 4, 6, 8, 12, 18 and 24 hours after surgery by an independent observer for pain using visual analogue scale (VAS), total analgesic consumption and time for the first rescue analgesic request. Rescue analgesia in the form of Tramadol 50 mg IV was given to patients on demand or when VAS was more than 4.

Results: The mean VAS score was significantly decreased in Group A (TAP block with 0.25% Ropivacaine) as compared to group B (no block). Time to first analgesic administration (Tramadol) was prolonged significantly in Group A (mean 18 hours) as compared to Group B (mean 8.67 hours), P <0.001. In patients receiving TAP block with 0.25% Ropivacaine (Group A), the requirement for analgesic significantly reduced as compared to those who did not receive the block (Group B) P <0.001

Conclusion: TAP block (by land mark technique) improved postoperative analgesia, reduced Tramadol consumption and prolonged the time for first rescue analgesic request after cesarean section.

KEYWORDS : Cesarean section, Ropivacaine, Transversus abdominis plane (TAP) block

Introduction:

The number of Cesarean section (CS) has increased over the last two decades, especially in the developed countries like India.[1] Due to skin incision, uterine incision and uterine contraction, CS commonly induces moderate-to-severe pain for 48 hours.[2] To expedite early ambulation, infant care, and prevention of postoperative morbidity, adequate postoperative analgesia is essential[3,4].

A multimodal analgesia is most likely to achieve these goals.

In the multimodal analgesic regimen, opioids are initially used to achieve adequate analgesia. Nonetheless they are associated with dose-dependent side-effects which include nausea, vomiting, pruritus, sedation, and respiratory depression. Therefore techniques that reduce or avoid the use of opioids may be of benefit in this population.

McDonnell et al. showed that landmark-based TAP (transversus abdominis plane) block can be used successfully to provide postoperative pain relief after CS.[3] TAP is the fascial plane between the internal oblique and transversus abdominis muscle, containing the thoracolumbar nerves T10 to L1. When a local anaesthetic in injected in this plane, the nerves (T10 to L1) are blocked.

We conducted this prospective study to compare the analgesic efficacy of TAP block (by land mark technique) as against no block after Cesarean section. We contemplate that the TAP block if used as a part of multimodal analgesia will reduce the need of additional analgesic during 24 hours after surgery, reduce the severity of pain and prolong the demand for first rescue analgesic.

Methods & Methodology:

The present study was conducted at B.K.L. Walawalkar Hospital & Diagnostic Centre, Dervan from March 2016 to February 2017. It was a randomized, double-blind study and approved by the institutional research ethics board. After informed written consent, 40 adult parturients belonging to American Society of Anesthesiologists (ASA) physical status I or II requiring elective CS were included in the study.

Patients who were (ASA) classification III-IV, patients with contraindications to spinal anesthesia or history of allergy to Ropivacaine, patient weight < 50 kg and patients with a BMI >35 kg/m^2 were not included in the study.

For the purpose of study parturients were randomly allocated by envelope method into two groups of 20 each. Patients in group A received the TAP block with 20 ml 0.25% Ropivacaine on either sides while the control group (Group B) received no block. The obstetrician, the patients, and nursing staff involved in direct patient care were unaware of the study group allocations. In all the patients involved in our study, obstetric anesthesia and TAP block was given by two anesthetists who were experts and had no involvement in the data collection.

Following the institutional protocol, all patients received intravenous (IV) ranitidine (50 mg) and metoclopramide (10 mg) half hour before surgery. Each patient was given spinal anesthesia with 2-2.2 ml of 0.5% heavy Bupivacaine at L3-5 level in sitting position after preloading with 500 ml of Ringers lactate. If required, 4 mg of ondansetron IV was given intraoperatively.

At the end of surgery, all patients of study group A received TAP block using landmark technique as described by McDonnell *et al*.[3,5] The patient being in supine position, the iliac crest was palpated till the latissimus dorsi muscle insertion was felt. Triangle of Petit was located and a 22 gauge 5 cm long blunt tip needle was inserted in it. Care was taken that the needle entered just above the iliac crest at right angle to the coronal plane until resistance was felt. This indicated that the needle tip pierced external oblique muscle. The needle was further advanced gently in the same direction until "pop" sensation was felt, which signaled entry into facial plane between external and internal oblique muscles. Still Further advancement resulted in 2nd "pop" and this indicated entry into TAP. After a negative aspiration 20 ml of

0.25% Ropivacaine was injected slowly in 5 ml accession. The same method was used to give block on the other side. In the control group B, the patients did not receive the block their skin was punctured on both sides after locating the triangle of Petit. At the end of surgery, IV Diclofenac 75 mg was given and repeated every 8 hourly.

The severity of pain was assessed by an independent investigator every 2, 4, 6, 8, 12, 18 and 24 hours postoperatively. It was appraised using the visual analogue score (VAS) (0 = no pain and 10 = worst possible pain). Rescue analgesia was given to patients on demand or when VAS was more than 4 in the form of Tramadol 50 mg IV.

Statistical analysis:
Demographic data were analyzed using Student's t- test. The comparison of total Tramadol requirement, time to first rescue analgesic administration and VAS between the two groups was done by paired t- test. We considered a statistically significant difference when P-value was less than 0.05.

Results:
Forty patients were recruited in the study, of these twenty were randomized to undergo TAP block with 0.25% Ropivacaine and remaining twenty received no block. Both study groups were comparable in terms of baseline demographic parameters like age, weight, gestational age, the number of previous CS and ASA scores (Table 1).

Table: 1 Patient demographic and Pre operative data

	Group A(n=20)	Group B (n= 20)	P value
Age	22±3.04	21.95±1.39	0.946
weight	54.30±2.45	55.7±2.99	0.114
ASA I/II	10/ 10	11/ 9	
Gestational age	38.05±0.89	37.95±1.00	0.74
Previous CS	9/ 11	12/ 8	

All the data are presented as mean ± SD except ASA classification and Previous CS (presented in numbers); P > 0.05, statistically non significant

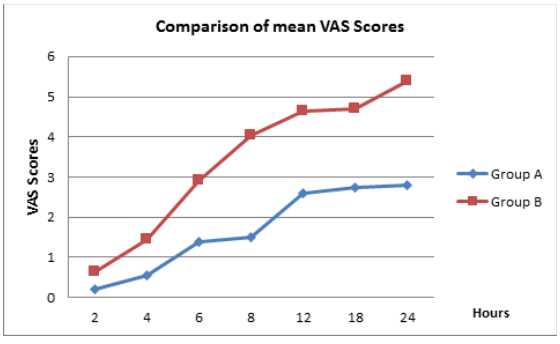
Table 2 shows mean VAS scores at 2, 4, 6, 8, 12, 18 and 24 hours post operatively. The mean VAS score was significantly decreased in Group A (TAP block with 0.25% Ropivacaine) as compared to group B (no block). the significance difference can also be noted in Graph 1.

Table 2: Mean **VAS** scores at different time intervals

Hours	Group A	Group B	P value
2	0.2±0.41	0.65±0.49	0.0032
4	0.55±0.51	1.45±0.51	< 0.0001
6	1.4±0.5	2.9±0.79	< 0.0001
8	1.50±0.51	4.05±1.23	< 0.0001
12	2.60±0.82	4.65±1.42	< 0.0001
18	2.75±0.64	4.7±1.63	0.0108
24	2.8±0.62	5.4±1.70	< 0.0001

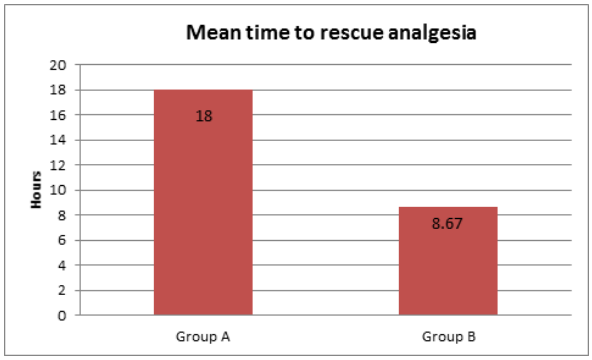
All the data are presented as mean ± SD; P < 0.05, is statistically significant

Graph 1:



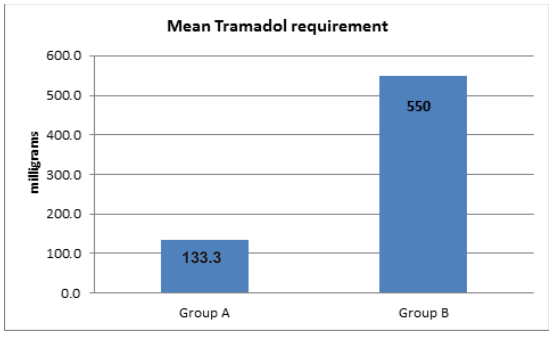
Time to first rescue analgesic administration (Tramadol) was prolonged significantly in Group A (mean 18 hours) as compared to Group B (mean 8.67 hours), P <0.001 (Graph 2)

Graph 2: Time for rescue Analgesia in hours



In patients receiving TAP block with 0.25% Ropivacaine (Group A), the requirement for analgesic significantly reduced as compared to those who did not receive the block (Group B) P <0.001 (Graph 3)

Graph 3: Mean tramadol requirement in milligrams in the first 24 h after Cesarean delivery



Discussion:
Post Cesarean section delivery pain consists of both visceral and somatic components. The uterine incision and contractions contribute to the visceral pain, while the somatic pain is derived from nociceptors located in the surgical wound.

Transversus abdominis plane (TAP) block is a newer approach of injecting local anesthesia into the plane between the internal oblique and transversus abdominis muscle and thus giving pain relief. Due to poor vascularity of the plane, the action of the injected drug is prolonged and not associated with any major complications. It was first described by Kuppuvelumani et al. in 1993 and was formally documented in 2001 by Rafi [6-8]. TAP block is suggested as part of the multimodal anesthetic approach and has been found to be a safe and effective tool in a variety of general, gynecological, urological, plastic, and pediatric surgeries.[9-11]

The results of our study showed that, TAP block when used as part of multimodal analgesic regimen after Cesarean delivery under spinal anesthesia, it delayed the time for first rescue analgesia, reduced the requirement of Iv Tramadol and decreased VAS scores during first 24 hours after surgery.

Previous studies have also shown clear analgesic benefit of TAP block in patients of cesarean section delivery. [3,10] Eslamian *et al*.[12] and Tan *et al*. [13] evaluated efficacy of TAP block versus no block in patients undergoing cesarean delivery under general anesthesia. Patients in TAP group had lower VAS pain scores, consumed less Tramadol and had a longer time to ask for first analgesia, than the patients who did not receive block. Recently Bhanulakshmi *et al*.[14] did a comparative study between TAP block versus intravenous Diclofenac for post-operative analgesia in elective LSCS. The researchers agreed upon the findings that TAP block was more effective and there was a significant decrease in requirement of opioids and also in pain scores in patients who received the block.

However, there are contradictory results of TAP block in studies by some other authors. Those researchers who used TAP block along with long acting intrathecal opioid as part of multimodal analgesia, did not find any enhanced quality of analgesia for post CS patients.[15,16] Studies

that compared intrathecal morphine with TAP block observed remarkable analgesia with intrathecal morphine as compared to TAP block.[17,18]

Due to legal issues, it is difficult to provide neuraxial opioid. In a rural set up like ours we have to constantly face challenge of limited supply of opioids and cost of medications. Furthermore, due to frequent side effects, risk of delayed maternal respiratory depression and lack of staff to strictly monitor morphine requirement, we preferred to use Tramadol as rescue analgesic in our study.

Many studies [5,11,19] evaluating TAP block have included a placebo group with intervention where saline was used for TAP block. However, the ethical legitimacy of using interventional placebo control regional analgesia has been questioned.[12] Therefore, instead of the placebo group, we used a control group where no block was given.

Ultrasound guidance can confirm the position of the needle and thus improve the certainty and safety of the block. However, ultrasound guidance for regional anesthesia has not been conclusively demonstrated to improve safety.[20] We preferred to use the landmark technique for giving the block.[3,5,7] This was also done keeping in mind to reduce the cost and make the procedure more acceptable amongst our patients and surgeons in this rural setup.

Limitations of the study:

1. The study was limited to assessment of postoperative analgesia up to the first 24 post operative hours.
2. Our sample size was not enough to assess the block-related complication in any patients.

Conclusion:

This study determines the analgesic effectiveness of TAP block (by land mark technique) after cesarean delivery. The block reduced the postoperative pain, total analgesic consumption, and prolonged the time required for analgesic supplements.. We recommend this block for all women undergoing cesarean delivery.

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