Original Article

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Modified Transversus Abdominis Plane (TAP) Block for Postoperative Analgesia Following Cesarean Delivery

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Abstract

Introduction: Adequate postoperative pain relief after Caesarean delivery (CD) improves ambulation, breastfeeding and infant weight gain. The analgesic efficacy of the TAP block has been confirmed and used for postoperative analgesia following CD. We studied the analgesic efficacy and safety of TAP by using Loss of Resistance (LOR) technique, as part of a multimodel analgesic regimen, in the first 24 h after caesarean delivery.

Materials and Methods: 60 patients of ASA physical status I-II, undergone Cesarean delivery under spinal anaesthesia were divided into two groups. Group T (n=30) patients received bilateral TAP block at the end of surgical procedure with 0.25% Bupivacaine (maximum dose of 2mg/kg). Group C patients received only conventional analgesic regime.

Results: In Group T, patients who received TAP block required less analgesics and the time to require a first analgesic requirement was longer than the Group C. In Group C the patients required rescue analgesics much earlier than Group T. The mean VAS score in Group T was 1.54+0.41 Vs 4.02+0.24 in control group which was statistically significant (P <0.01). The TAP block significantly reduced the incidence of sedation (7% Vs 61%).

Conclusion: We would like to conclude that administration of TAP block as a part of the multimodal analgesia provides effective analgesia and results in reduction of analgesic drugs requirement following Cesarean delivery.

Keywords: Cesarean Delivery; TAP Block; LOR Technique; Postoperative Analgesia.

Introduction

Effective postoperative analgesia improves or facilitate early ambulation, and even improve the postoperative outcome by the prevention of postoperative morbidity like ineffective cough, atelectasis etc [1]. The major contribution towards postoperative pain after abdominal surgeries is from the abdominal wall [2]. Inadequate postoperative pain relief after Caesarean delivery(CD) can negatively impact ambulation, breastfeeding, and even maternal bonding [3], while effective analgesia improves ambulation, breastfeeding and infant weight gain [4]. Neuraxial anaesthesia has become the anaesthetic technique of choice in CD because of its safety and reduction in maternal morbidity [5].

The technique of analgesia must provide safe, effective analgesia, with minimal side effects for the mother and her child. The analgesic efficacy of the TAP block has been confirmed in several studies [6-9], and had been used for postoperative analgesia following CD [10]. Even though several studies shown the analgesic efficacy of the TAP block [9,11], others found no analgesic benefit [12,13].

We studied the efficacy of TAP block, as part of a multimodel analgesic regimen, would result in decreased opioid consumption and improved analgesia in the first 24 h after caesarean delivery.

Methods

We have enrolled 60 patients after approval from hospital ethics committee for a prospective nonrandomised study. Patients were of ASA physical status I – II. All patients were scheduled to undergo Caesarean delivery via a Pfannentiel incision under spinal anaesthesia. Patients were excluded if there was a history of

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relevant drug allergy, or treatments with opioids. They were divided into two groups. Group T (n=30) and Group C (n=30). All patients received Inj. Ranitidine 50mg intramuscularly 1 hour before the procedure. Group T received TAP block with 0.25% bupivacaine (20 ml), to a maximum dose of 2mg/kg for both side together. The TAP block was performed on both sides. Group C patients received conventional analgesic regime.

All patients received a standard spinal anaesthesia block (SAB) consisting of 10mg of Bupivacaine heavy 0.5% with fentanyl 25 microgram. Patients also received rectal diclofenac 100mg. Prophylactic antiemetic was (Injection Metoclopramide 10mg intravenously) given.

The TAP block was performed at the end of procedure by one investigator using the following technique. A modified Loss of Resistance (LOR) technique was used to locate the TAP. Even though the literature describes the block to be performed in the 'Lumbar triangle – Petit's triangle', we have used modified approach to achieve TAP block (Figure 1 and 2) [29]. We adopted the technique described by Dr. Shiv kumar Singh by using the Loss of Resistance technique (LOR). The investigator standing on the same side of the block to be given, the iliac crest & lower most point of costal margin were palpated. In the mid-axillary line, a point midway between the costal margin and iliac crest was marked. After necessary sterile preparation and draping, an 18G Toughy needle is connected with a syringe loaded with 10 ml of local anaesthetics (LA). Once the skin barrier is breached, the needle is advanced through the external Oblique, and a first 'pop' sensation is felt when the needle enters the plane between External oblique & internal oblique muscles. Further advancement of the needle results in a second 'pop' after it passes through IO fascia into the TAP. At this point after careful aspiration to exclude vascular puncture a test dose of 1ml of 0.25% Bupivacaine was injected. After confirming the negative test dose, 20 ml of the drug is injected in 3 ml aliquots. The TAP block was then performed on the other side in the same manner described above. The maximum total dose of Bupivacaine administered was 2mg/kg, including both sides. All patients were transferred to the PACU. A standard postoperative analgesic regimen consisting of Inj. Diclonefac 75 mg i.m 8th hourly combined with Inj. Tramadol 1mg/kg i.v12th hourly. Inj. Paraacetamol 1 g i.v infusion was given as a first rescue analgesic followed by Inj. Tramadol 50 mg i.v as a second rescue analgesic.

The severity of pain was assessed by using Visual Analogue Scale (VAS). The patient was asked to score the severity of pain between no 1 to 10.The presence and severity of pain (VAS score), nausea, vomiting and sedation were assessed at periodic intervals. These assessments were performed at 2, 4, 6, 12, and 24 hour intervals after TAP block. All patients were asked to give score for pain at rest as well as on movement (knee flexion). VAS on movement was assessed at 12 and 24 hour after surgery. The sedation was scored by using Modified Ramsay Sedation Scale (Table 5). Inj. Ondansetron 4 mg i.v was given for nausea and vomiting. The study period was up to 24 hours after TAP block.

The primary outcome measure in this study was first to evaluate analgesic efficacy of modified TAP for postoperative pain as a multimodal regime following Cesarean delivery. Secondary outcome measures include the success rate and safety profile of modified approach of TAP block.

Statistical Analysis

All the variables are expressed in terms of mean and standard deviation. Chi-square test and Student t test were used to analyse the statistical significance, where p value of <0.05 was considered to be significant.

Results

We have enrolled sixty patients for this study. 30 patients received TAP block (Group T) and another 30 patients (Group C) were received conventional analgesic regime. There was no difference in demographic variables (age, weight and height etc) between both groups (Table 1). The TAP block was performed in all patients in first attempt and without any complications. The TAP block reduced the pain score at all the time intervals (Graph 1). In Group T, patients who received TAP block required a less analgesics and the time to require a first analgesic requirement was longer than the Group C. In Group C the patients required rescue analgesics much earlier than Group T (Table 2).

The mean VAS score (Table 3) in Group T was 1.54+0.41 Vs 4.02+0.24 in control group which was statistically significant ($P<0.01$). Postoperative VAS pain scores at rest and on movement were reduced after TAP block (Table 4). The sedation score of 2 (Lightly sedated) was higher in Group C patients when compared with Group T patients (61% in group C, 7% in group T) which was statistically significant

Table 1: Demographic variables

Variables	Control	Tap	P Value
Age	31 ± 6.7	32 ± 4.6	Ns
Weight	69 ± 6.3	68 ± 8.2	Ns
BSA	1.6 ± 1.3	1.6 ± 1.3	Ns

Table 2: Requirement of rescue analgesics in both groups

Timing	Rescue Analgesia Control	Tap	T value	P value
0 - 30 M	0	0	NS	NS
30 - 60 M	0	0	NS	NS
60 - 90 M	8 (26%)	1 (3%)	6.36	0.011
90 - 120 M	8 (26 %)	0	9.18	0.002
2 - 4 HR	12 (39%)	0	9.22	0.0023
4 - 6 HR	20 (65%)	0	15.08	0.0001
6 - 12 HR	30 (97%)	17 (55%)	14.86	0.0001
12 - 24 HR	30 (97%)	12 (39%)	23.91	0.000001

Table 3: Mean comparison of vas score

Vas Score	N	Mean	SD	F value	P value
TAP block	30	1.54	0.41	581	<0.01
Control	30	4.02	0.24		

Table 4: Vas on movement

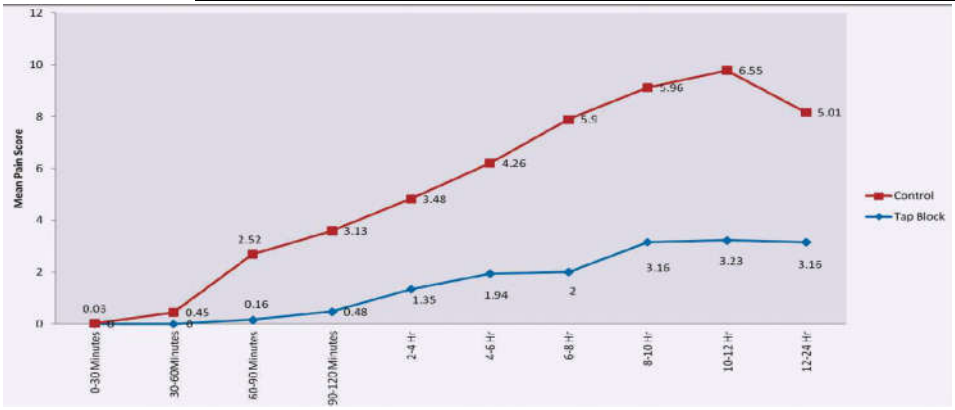
Hours	Control	Tap	T value	P value
4-6 hours	5.9 ± 1.0	2 ± 1	15.27	<0.00001
6-12 hours	6.5 ± 0.5	3.2 ± 1.2	13.44	<0.00001

Table 5: Modified ramsay sedation scale

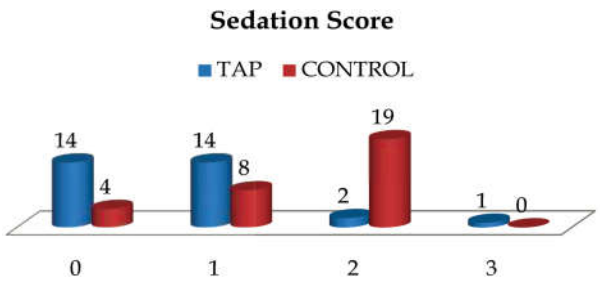
Score	Clinical Response
0	Paralyzed, Unable to evaluate
1	Awake
2	Lightly sedated
3	Moderately sedated, follows simple commands
4	Deeply sedated, responds to nonpainful stimuli
5	Deeply sedated, responds to painful stimuli
6	Deeply sedated, unresponsive to painful stimulli

Table 6: Sedation score

Score	Sedation Score Control	Tap	T Value	P Value
0	4 (13%)	14 (45%)	7.82	0.005
1	8 (26%)	14 (45%)	2.5	0.111
2	19 (61%)	2 (7%)	20.8	0.000005
3	1(3%)	0	1.01	0.3133



Graph 1: VAS Score at different intervals in both groups



Graph 2: Sedation score

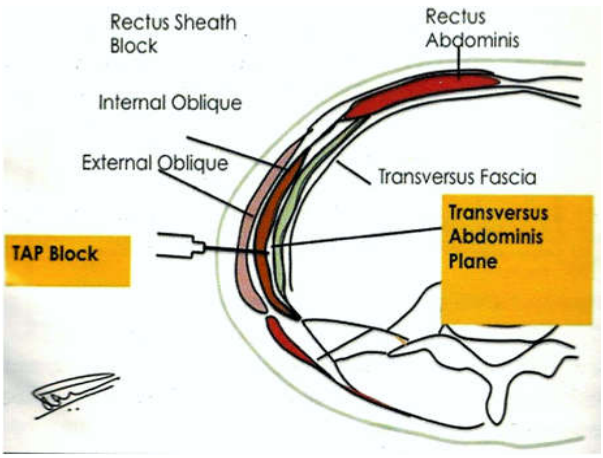


Fig. 1:

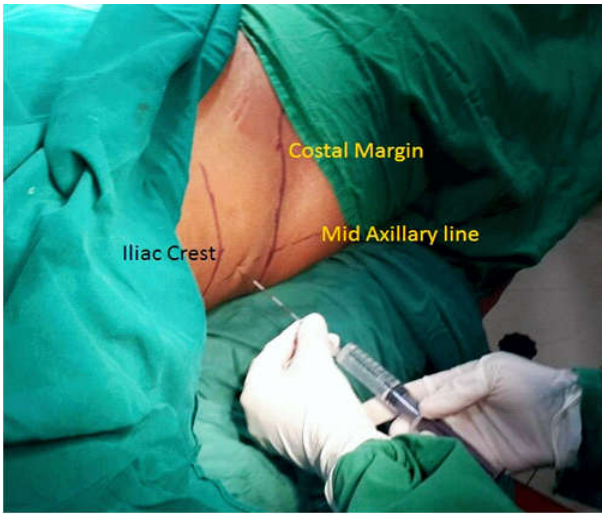


Fig. 2:

(P = 0.00005) (Table 6, Graph 2). There was no difference in the incidence of nausea or vomiting between two groups.

Discussion

A recent meta-analysis suggested that TAP block constitutes an effective analgesic option capable of reducing 24 h opioid consumption, 24 h rest pain scores, and PONV in parturient undergoing Caesarean Delivery who receive a multimodal analgesic regimen that excludes Intrathecal morphine [14]. Reduction in opioid analgesics is generally desirable in CD. Although opioid analgesics can be taken safely by lactating women, some opioids can result in significant exposures and toxicity in infants [25], including the risk of neurobehavioural depression in the breastfed newborn [16]. Some trials suggest a potential role of TAP block as a part of the post-caesarean multimodal analgesic settings [17,18]. We have not performed a TAP block with saline to avoid the possibility of potential harm as well as it might predispose the parturients to the unnecessary risks [19-22].

The analgesic regimen for post CD shoul provide safe, effective analgesia, with minimal side effects for mother and her child.Our study demonstrated that TAP block when administered as a part of a multimodal analgesic regimen reduced the first 24 hour analgesic requirements and parients who received the TAP block had reduced pain scores. Even the first requirement for analgesic supplementation also delayed.

The neuraxial blockade with long acting opioids produce effective analgesia, but they are associated with a frequent incidence of side effects, particularly nausea, vomiting, and pruritus, which reduce overall patient satisfaction [1]. The Hydrophilic opioids can spread rostrally which may result in delayed maternal respiratory depression [23].

Due to the presence of so many limiting factors for the administration of neuraxial blockade with the long acting opioid like morphine and the possibility of systemic opioids like meperidine secreting into breast milk and produce transient adverse neurobehavioral effects in the neonate [24], there is a considerable potential for TAP block to be a part of multimodal regimen for postcesarean delivery analgesia.

As the abdominal wall is a major contributor to acute postoperative pain after abdominal surgery [25], field blocks like TAP block [26] can provide effective analgesia for a variety of abdominal surgical procedures [26,27].

We had shown that TAP provides effective analgesia for post-CD parturients when given as a part of a multimodal analgesic regimen. And our study also demonstrated that a single-shot TAP block can produce effective analgesia for up to 24 hours. The reason for the prolonged duration of analgesic effect after TAP blockade may relate to the fact that the TAP is relatively poorly vascularised, and

therefore drug clearance may be slowed [28]. Even the TAP block improved the pain score during movement (knee flexion), suggesting that TAP block will allow the early ambulation of the patients.

Recently people prefer to perform the regional nerve blocks under Ultrasound guidance. Studies also suggest that using ultrasound may improve safety of performing nerve blocks, but the main limiting factor will be the non-availability of Ultrasound machine. Still these blocks can be performed safely and effectively. The Loss of Resistance (LOR) technique relies on using blunt or short bevelled needles, which provide a good feedback (pops or clicks) when they pass through fascial planes. Before feeling the loss of resistance, it is always nice to feel the bounce on the fascia. We have adopted the technique described by Shiv kumar singh and S.M. Gulyam Kuruba [29]. We have shown that TAP block can be performed safely and effectively by this modified approach using LOR technique. To our knowledge our study is the first one to study the the safety and analgesic efficacy of this modified approach with LOR technique even though it has been described in the literature.

We have a few limitations to our study. First it is a non-randomized study and the number of patients may not be large enough to assess the safety of the procedure. But none of the patient had any complication related to either the procedure related (like peritoneal puncture) or drug related. We didn't have a control group with USG guided TAP block to have a comparative data. We would like to conclude that administration of TAP block as a part of the multimodal analgesia provides effective analgesia and results in reduction of analgesic drugs requirement following Caesarean delivery. It can be done safely with LOR technique.

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