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Original Article

Evaluation of Transversus Abdominis Plane Block for Postoperative Analgesia after Lower Segment Cesarean Section

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Abstract

Background: Lower segment cesarean section (LSCS) is a common surgery in young women. There is a need for good postoperative analgesia in these cases as these patients are new mothers who need to nurse their newborns and there is a very important aspect of mother and child bonding for which they need to remain pain free and alert. For this, we need to rely on techniques which are not dependent on opioids and are equally effective. Transversus abdominis plane (TAP) block is one such technique which seems to fit the bill. This study was undertaken to evaluate the effectiveness of TAP block as a postoperative analgesia technique in these cases and its usefulness in reducing postoperative opioid consumption. **Methods:** One hundred and forty patients were selected prospectively who were to undergo LSCS. They were randomly divided into two groups: CONT and TAP. CONT group received subarachnoid block (SAB) with hyperbaric bupivacaine, and TAP group received similar SAB and immediately after surgery was given TAP block under ultrasound guidance with 20 ml of 0.25% bupivacaine with 4 mg dexamethasone on each side. Pain score was monitored in the postoperative period, every hour for 4 h and 2 hourly for next 4 h and then at 12, 18, 24, 36, and 48 h with visual analog scale of the scale 0 to 10. They all received intravenous paracetamol 1000 mg 8 hourly. If the pain score crossed four, they were given intramuscular (IM) diclofenac sodium 75 mg and if pain score persisted above four after an hour, they were given IM pethidine 50 mg. The time to requirement/demand of rescue analgesia was noted and a total amount of opioids given were noted. **Results:** The mean time to first analgesic rescue was significantly prolonged in Group TAP as compared to Group CONT using unpaired *t*-test. Mean time to rescue analgesia was 88.02 ± 21.62 min and 525.27 ± 114.52 min ($P < 0.001$) in groups CONT and TAP, respectively. Opioid consumption in Groups TAP and CONT was 14.29 mg versus 166.95 mg ($P < 0.001$) in 48 h. **Conclusion:** TAP block is a very effective modality for postoperative pain relief after LSCS. It helps in reducing opioid consumption and is likely to keep them more alert.

Keywords: Lower segment cesarean section, spinal anesthesia, subarachnoid block, transversus abdominis plane block, transversus abdominis plane block

Introduction

Pain is one of the most important and most common problems for which the patients seek medical help. Relieving pain is one of the most important physician functions second probably only to life and limb-saving functions. This function becomes all the more important when it comes to postoperative pain because, for whatever reasons, this pain has been created by physicians themselves. Apart from the emotional and humane reasons, the pain has a strong bearing on the postoperative recovery and long-term well-being of the patients. In obstetric cases, there is another dimension added to it. Postoperatively, after the lower segment cesarean section (LSCS), there is a baby who the mother is required to nurse and look after, and there is an aspect of mother and child emotional bonding. All these aspects are adversely affected if the pain is excessive or inadequately treated. If we treat it too aggressively with narcotics, the patient is likely to become sedated which is likely to hamper her functions as a mother and also adversely affect the mother and child bonding. If the postoperative pain can be managed by regional anesthesia technique, then the

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quality of pain relief is likely to be much superior and is not associated with any sedation. So far, only regional anesthesia technique available was epidural analgesia. Although epidural analgesia is an excellent technique, it is also associated with higher complications such as hypotension, urinary retention, muscle paralysis, and falls and entails higher risk to the patient needing much closer monitoring.

Now, a newer technique of peripheral nerve block is fast becoming very popular in managing postoperative pain after lower abdominal surgery.[1-3] It entails filling up the plane between internal oblique (IO) and transversus abdominis (TA) muscles where most of the somatic muscles supplying the lower anterior abdominal wall traverse. Bilateral block of these muscles causes excellent pain relief after lower abdominal surgeries. Earlier this block used to be given blindly relying on the feeling of pop in triangle of petit. Due to the blind technique, the reliability was not as good. With the increasing use of ultrasound, the reliability and safety of this block have increased considerably.[4]

With the above background, it was envisaged to evaluate TA plane (TAP) block as a technique for postoperation analgesia after LSCS under spinal anesthesia in seventy patients and compare it with seventy patients who underwent the same surgery under same form of anesthesia and were managed conventionally without the TAP Block.

Methods

After the approval of the Institutional Ethical Committee and written informed consent, 140 American Society of Anesthesiologists (ASA) Grade I and Grade II patients scheduled to undergo LSCS) were randomly divided into two groups: CONT group and TAP group by the sealed envelope technique. The CONT group acted as control and was given spinal anesthesia (SA) with 0.5% bupivacaine heavy 3.0 ml in L3–L4 subarachnoid space with a 27G Whitacre point spinal needle in lateral position. They were immediately turned in supine position. Patients in TAP group received the same spinal anesthesia, but after completion of surgery and before applying dressing on the wound, were also given TAP block under ultrasound guidance with 23G 100-mm needle with 0.25% bupivacaine 20 ml along with dexamethasone 4 mg in each side. Since TAP is mainly a pure sensory block and we were giving it as a single shot, we wanted it to have the maximum duration. As adding dexamethasone to local anesthetic prolongs the duration of the block, hence, we chose to add it the local anesthesia (LA).[5] All the patients were given intravenous paracetamol 1000 mg 8 hourly for 48 h. Pain score was monitored in the postoperative period, every hour for 4 h and 2 hourly for next 4 h and then at 12, 18, 24, 36, and 48 h with visual analog scale (VAS) from 0 to 10 with 0 being no pain and 10 being maximum pain they could imagine. When the pain score came above 4, the patient was given intramuscular (IM) diclofenac sodium 75 mg and time to rescue analgesia was noted. If the pain score persisted above 4 even after 1 h of giving diclofenac sodium, IM pethidine 50 mg was given. Vital parameters were monitored every 10 min during intraoperative period and half-hourly for 24 h in the postoperative period.

Exclusion criteria

All the patients in ASA-III or above, who were unwilling, allergic to LA, on anticoagulants, and those with local infection in the thigh were excluded from the study.

Transversus abdominis plane block

Anatomy

The Abdominal wall in the flanks consists of, from superficial to deep, skin, subcutaneous fat, followed by three flat muscles, the outermost being external oblique followed by generally the thickest IO and then the thinnest TA. Deeper to the muscles are fascia transversalis and peritoneum which generally appear as one layer and bowel is seen below it. The somatic nerves traverse through the plane between IO muscle and TA muscle. TAP block is field block entailing flooding this plane with local anesthetic mixture.

Sonoanatomy

A high-frequency linear probe when kept horizontally in the flank at the level of umbilicus shows from top to bottom after the skin and the subcutaneous fat, three layers of hypoechoic muscles with hyperechoic fascia in-between them. The middle IO is generally the thickest. Beneath the TA you see the peritoneum with bowel seen moving underneath [Figure 1].

Procedure

After local cleaning and draping, high frequency linear probe was kept horizontally on the flank at the level of umbilicus in anterior axillary line. All the three layers of abdominal muscles were identified and a 23 g 100 mm needle attached with local anesthetic mixture with a 50 mm extension line was introduced by in-plane technique. When the tip of the needle reached the fascia between IO and TA, after careful aspiration to rule out intravascular placement, a test injection of 0.5 ml was made, opening up of TAP plane was looked for and needle adjusted if required accordingly and test injection repeated, when the TAP plane is seen opening up, the whole amount of drug

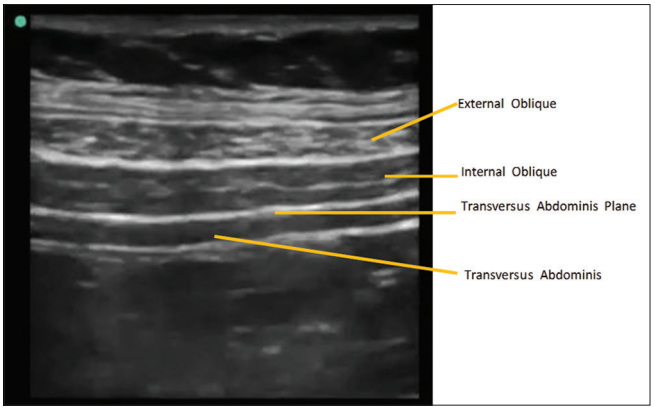

Figure 1: Transversus abdominis plane sonoanatomy

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was injected. The same procedure was repeated on the other side [Figure 2].

Results

The two groups were comparable with regard to age, ASA status, and duration of surgery [Table 1]. Characteristics of subarachnoid blocks were similar in both groups including sensory and motor block onset as well as regression time when assessed with unpaired *t*-test.

Statistical analysis by unpaired *t*-test showed that the mean time to first analgesic rescue was significantly prolonged in Group TAP as compared to Group CONT. Mean time to rescue analgesia was 88.02 ± 21.62 min and 525.27 ± 114.52 min ($P < 0.001$) in groups CONT and TAP, respectively [Figure 3].

Mann–Whitney U-test was used to assess the mean pain scores as noted at various time intervals in postoperative period [Figure 4]. Mean pain scores were persistently low in group TAP ($P < 0.001$). Pethidine required was significantly low in TAP group compared to CONT group, 14.29 mg versus 166.95 mg. Only 28.57% of patients in TAP group required narcotic analgesia compared to 100% in CONT group in first 24 h, while in next 24 h, none of the patients in TAP needed narcotic analgesia, while 84.74% of patients in CONT group still needed narcotic analgesia. No adverse effects including sensory or motor weakness and falls were recorded. VAS scores were also consistently lower in TAP group [Figure 4]; the difference although statistically significant was not glaring as any increase in VAS score was promptly responded to with initially IM diclofenac sodium and later by IM pethidine if needed.

Discussion

Women because of their role in reproduction and the anatomy peculiar to this role have to undergo a number of pains and discomforts during their lifetime such as menstrual bleeding, menorrhagia, and labor pains. Medical intervention in this process has added another pain to it that is postoperative pain of LSCS. As anesthesiologists, it is our moral duty to relieve this pain as much as possible and in a safe manner without interfering in her role as a mother. This pain apart from causing emotional trauma to her also interferes in early lactation of the newborn and also adversely affects in early emotional mother and child bonding. Systemic or neuraxial opioids, nonsteroidal antiinflammatory drugs (NSAIDs), and epidural analgesia have been the main methods of providing analgesia to these women.

Table 1: Demographic variables

Characteristic	CONT group	TAP group	*P*
Age (year)±SD	27.56±3.85	27.53±3.76	0.96
ASA physical status I/II	4/70	5/70	0.70
Duration of surgery (min)	35.75±10.42	34.19±8.61	0.36

SD: Standard deviation, ASA: American Society of Anesthesiologists, TAP: Transversus abdominis plane, CONT: Control

These methods have their own problems. NSAIDs are not adequate for postoperative pain relief; systemic opioids cause sedation and respiratory depression; neuraxial opioids have their problem of pruritic and urinary retention and respiratory depression. Nowadays, the efforts are directed to reduce the use of opioids as much as possible while maintaining the same level of or better analgesia. TAP block is a newer method in

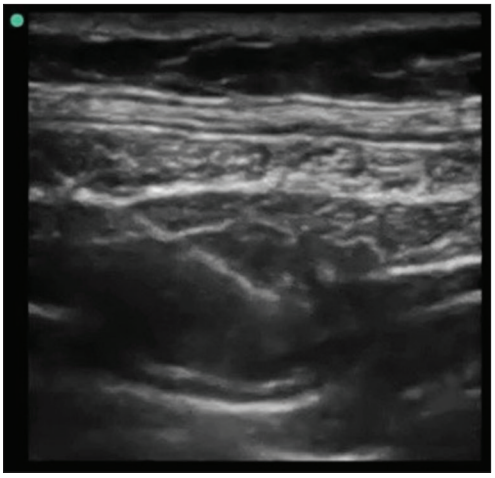

Figure 2: Spread of drug in transversus abdominis plane

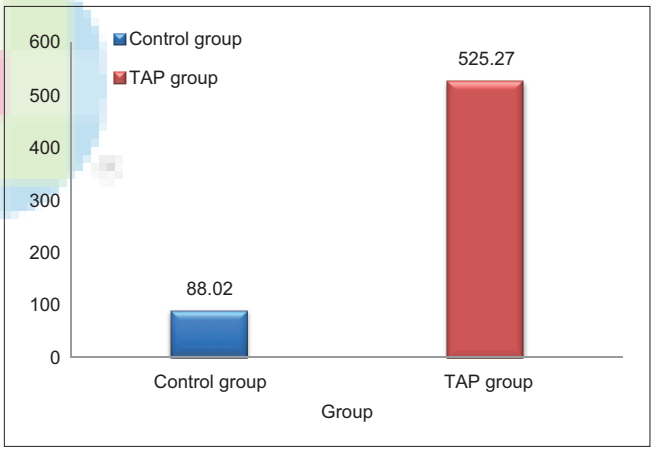

Figure 3: Mean time to rescue analgesia

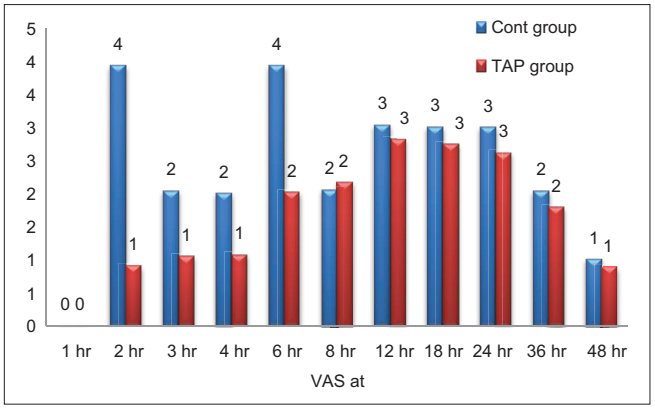

Figure 4: Mean visual analog scale score

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the armamentarium of anesthesiologists to reduce the opioid use while improving the level of analgesia.

In our study, we found that time to rescue analgesia was significantly prolonged, and the opioid consumption was significantly reduced. Chansoria *et al*. also performed a similar study and found that TAP block significantly reduced the pain scores and postoperative analgesic requirement.[6] Moyo *et al*. also had similar findings after abdominal hysterectomies.[7]

Kadam *et al*. compared TAP block for postoperative pain relief after laparoscopic cholecystectomy with wound infiltration with local anesthetic and found no difference between the two.[8] Point to be noted is that the surgery they were dealing with was an upper abdominal surgery. The main site of pain is the port high in the epigastrium. This site is generally not suited to be covered with a TAP block which is more suited for infraumbilical surgeries. The nerve supplying the epigastric area (T6) generally comes directly from the intercostal space to epigastrium rather than going to the TAP plane in the flank.

Tan *et al*. studied the efficacy of TAP block after LSCS done under general anesthesia and they also found a significant reduction in postoperative pain scores[9] and found a significant reduction in analgesic consumption; our study was commensurate with them.

Iyer *et al*. compared continuous TAP block with a continuous epidural block in lower abdominal surgeries and found them to be comparable for first 16 h.[10] We, however, give TAP block in single-shot mode and compared with systemic analgesics and got similar results.

Conclusion

From our study, we conclude that TAP block is a very good technique for postoperative analgesia after LSCS under spinal anesthesia. It is an excellent addition to multimodal analgesia regimen and significantly reduces the opioid requirements. The patients remain more pain free and likely to be more alert, leading to better mother and child bonding and likely to keep the mother more capable of doing her child-caring chores and lactation.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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