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EFFICACY OF ULTRASOUND GUIDED BILATERAL TRANSVERSUS ABDOMINIS PLANE BLOCK FOR POSTOPERATIVE ANALGESIA IN PATIENTS UNDERGOING ELLECTIVE CAESAREAN SECTION UNDER SPINAL ANAESTHESIA

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ABSTRACT

Background: Pain after cesarean section has two components, due to skin incision (somatic pain) and uterine contraction (visceral pain). Inadequately treated postoperative pain may affect mother-child bonding, care of newborn baby, and breastfeeding and may increases risk of postoperative complications such as venous thromboembolism, associated respiratory complications and prolong hospital stay. Transversus abdominis plane (TAP) block is a fascial plane block (located between the internal oblique and transverse abdominis muscles), thus providing post‑operative analgesia in infra‑umbilical surgery by blocking neural afferents between T6 and L1. In this study, we evaluated postoperative analgesic efficacy of USG guided TAP block with bupivacaine for 24 h after elective caesarean section through a Pfannenstiel incision under spinal anaesthesia. **Methods:** 80 parturients scheduled to undergoing elective cesarean section under spinal anesthesia with bupivacaine were randomly allocated into two groups. At the end of surgery they receive either ultrasound-guided bilateral TAP block (group B, n=40 patients) with 20 ml of 0.25% bupivacaine or no TAP block (group C, n=40 patients), in addition to standard analgesia with intravenous 1gm paracetamol TID and 75 mg diclofenac TID. Each patient was assessed at 0, 1, 2, 4, 6, 12, and 24 h after surgery by an independent observer for pain by visual analogue score (VAS) and requirement of rescue analgesia, time of 1st demand for tramadol, total consumption of tramadol, satisfaction with pain management and side effects. **Results:** Total tramadol consumption was reduced by 60% in patients received bilateral TAP block with bupivacaine compared to patients given no block during 24 h after surgery ($P < 0.001$). Post‑operative VAS was lower in study group 9Group B) both on rest and activity at each time point for 24 h ($P < 0.001$), time of first rescue analgesia was significantly prolonged, better patient's satisfaction score, and side effects like nausea and vomiting were less in study group compared to control group. **Conclusion:** US guided bilateral TAP block reduced tramadol consumption, improved postoperative analgesia, and patient's satisfaction regarding analgesia after caesarean section in the first 24 h.

KEYWORDS: Ultrasound guided (USG), transversus abdominis plane (TAP) block, internal oblique muscle (IOM), transversus abdominis muscle (TAM), Bupivacaine, postoperative analgesia, visual analogue scale (VAS), cesarean section C/S.

INTRODUCTION

Substantial pain and discomfort anticipated after caesarean delivery is usually described as moderate to severe, and is associated with various postoperative complications. Thus, safe and effective post‑operative analgesia is important after surgery to avoid various complications.[1] Neuraxial or Systemic opioids are the mainstay for treating postoperative pain, but they are associated with a number of undesirable side effects like nausea, vomiting, constipation, pruritus and respiratory depression.[2,3] Non-steroidal anti-inflammatory drugs when used alone are insufficient to treat postoperative pain. Currently, multimodal analgesic technique involving abdominal nerve block with parenteral analgesics is technique of choice for managing postoperative pain.

Transversus abdominis plane (TAP) block is a recently introduced regional technique between the internal oblique and transversus abdominis muscle that blocks abdominal wall neural afferents between T6 and L1 and thus can relieve pain associated with an abdominal incision.[4,5,6] Postoperative analgesic efficacy of TAP block in several abdominal surgeries and for post cesarean analgesia has been confirmed.[2,7,8,9]

The aim of our study is to evaluate the post cesarean analgesic efficacy of ultrasound-guided TAP block. We

hypothesized that the USG‑guided TAP block, as a part of multimodal analgesia will reduces requirement of tramadol in the first 24 hours after surgery and provides adequate and effective post-operative analgesia.[10]

MATERIALS AND METHODS

After obtaining approval from the Institutional Ethical Committee and written informed consent, eighty American Society of Anesthesiologists (ASA) I and II patients scheduled for elective caesarean section under spinal anesthesia were included in our prospective and randomized double‑blind study. Patients were excluded from the study if they refused, ASA III-IV, morbidly obese with a BMI >40, patients with contraindications to spinal anesthesia or history of allergy to bupivacaine or required general anesthesia for the surgery.

The recruited patients were randomly assigned to one of the two groups by sealed envelope technique which was opened just before cesarean section. Group B: received USG- guided bilateral TAP block with 40 ml 0.25% bupivacaine and Group C: received no block.

All patients received intravenous ranitidine 50 mg and preloading with 500 ml of Ringers lactate 15-20min before transferring to OT. All participants received spinal anesthesia with 2-2.2 ml of 0.5% hyperbaric bupivacaine at L3-5 level in sitting position. if needed, 4mg of ondansetron IV was used as Intra-operative antiemetics. At the end of the surgery, all patients in both the groups received injection paracetamol 1 g and diclofenac 75 mg intravenously ist doses.

At the end of surgery after skin closure, all patients in group B received ultrasound-guided TAP block with 40 ml of 0.25% isobaric bupivacaine. Skin was prepared with 2% chlorhexidine solution and a high-frequency (13-6 MHz) ultrasound probe was used. Ultrasound probe was positioned in mid-axillary line half way between costal margin and iliac crest. The subcutaneous fat, external oblique muscle, internal oblique muscle, transversus abdominis muscle, peritoneum, and intraperitoneal cavity were identified. A 100 mm long 20G insulated short bevel needle (Stimuplex A B/BRAUN) was inserted in plane technique to ultrasound probe anteriorly to lie between internal oblique muscle and transversus abdominis muscle, After careful negative aspiration a total of 20 ml 0.25% isobaric bupivacaine solution was injected in each side (right and left). Patients in group C received no block.

All patients were then transferred to the post‑operative recovery room (PACU) and assessed by an investigator blinded to the study. Pain severity was assessed every 1, 2, 4, 6, 12 and 24 h. It was measured using visual analogue score (VAS) (0 = no pain and 10 = worst possible pain). Rescue analgesia was given with IV tramadol 2 mg/kg to patients on demand or when VAS was more than 4. The primary outcome was the total tramadol consumption over 24 hours after surgery. The secondary outcome measures were pain scores, time of first rescue analgesia, side effects like nausea and vomiting, and patient's pain satisfaction score over 24 hours. If patients complained of persistent nausea or vomiting metoclopromide 10 mg was given.

Chi-square test was used to compare nominal variables between two groups, i.e. postoperative nausea-vomiting and patient's satisfaction score. Student's t-test was used for independent groups to compare measurable variables between both groups i.e. age, BMI, weight, height, tramadol consumptions and visual analogue score. $P < 0.05$ was considered statistically significant.

RESULTS

Eighty patients were included in study and randomly assigned into two groups. In Group B 40 patients received USG- guided bilateral TAP block with 20 ml 0.25% bupivacaine on both sides (total 40ml) and in Group C 40 patients received no block for post-operative analgesia after elective LSCS under spinal anesthesia.

The mean age (mean± SD) in Group B was 28±5 years and in Group C was 26±7 years. Both the groups were comparable in terms of age (p=0.522).

The mean height (mean± SD) was 155±8 cm and 158±5 cm in Group B and Group C, respectively. The groups were comparable in terms of height (p=0.432).

The mean weight (mean± SD) was 63±5 and 62±5 kg in Groups B and C, respectively, which was not statistically significant (p=0.428).

Therefore, both groups were comparable in terms of their demographic profile **(Table 1)**.

Table 1: Demographic parameters in two groups.

Demographic Parameters	Group B (Mean ± SD)	Group C (Mean ± SD)	P-value
Age (years)	28± 5	26± 7	0.522
Height (cm)	155±8	158± 5	0.432
Weight (kg)	63±5	62±5	0.428

The mean duration of surgery (Mean ± SD) was 58±8 min and 56±8 min in Groups B and C respectively, which was comparable and statistically insignificant (p=0.505).

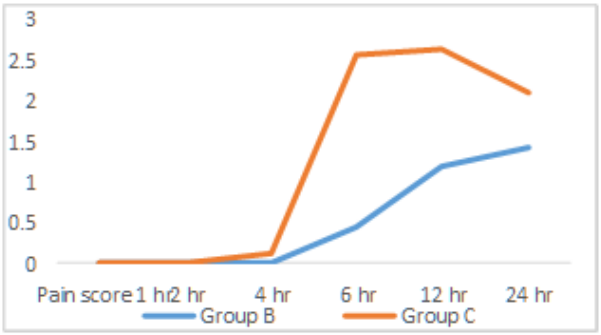
The mean time to first request of rescue analgesia (Mean ± SD) in Group B was 480±30 min and in Group C 240±30 min (P= 0.000) which was statistically significant

The mean total tramadol consumption (Mean ± SD) was 100±30 mg and 200±50 mg in Groups B and C respectively, which was statistically significant (p=0.000), as shown in **(Table 2)**.

Table 2: Duration of surgery (min), Time to first request of rescue analgesia (min) and Total tramadol consumption (mg).

Parameters	Group B (Mean ± SD)	Group C (Mean ± SD)	P-value
Duration of surgery (min)	58±8	56±8	0.505
Time to first request of rescue analgesia (min)	480±30	240±30	0.000
Total tramadol consumption (mg)	100±30	200±50	0.000

Graph 1 shows that the mean VAS score at 1, 2, 4, 6, 12, and 24 h in Group B was 0, 0,0, 0.457± 0.257, 1.189± 0.446 and 1.433±0.567 respectively, and in Group C was 0, 0, 0.121±0.560,2.566±1.452, 2.635± 0.750 and 2.1±0.566, respectively. The mean NRS score at 1, 2, and 4 h was not statistically significant and had nearly equal NRS score. However, at 6, 12, and 24 h, the mean NRS score was statistically significant and lower in Group B than in Group C.



Graph 1: Mean VAS score in Group B & Group C.

Table 3 shows that the overall patient satisfaction score at 24 h postoperatively was found to be considerably higher in Group B than in Group C (p=0.000).

Table 3: Patient Satisfaction Score of two groups.

	Patient Satisfaction Score			
	Excellent	Very Good	Satisfactory	P-value
Group B	1033. 30%	3066. 70%	00. 00%	0.000
Group C	00. 00%	2253. 30%	1846. 70%	0.000

This study found that mean vitals such as heart rate, arterial blood oxygen saturation, mean arterial pressure, and respiratory rate were stable and comparable at all times; however, at the 6th h, there was an increase in HR and RR in Group C but statistically insignificant.

There were no cases of local anesthetic systemic toxicity (LAST) or hematomas. In Group B & C 5 & 9 patients respectively complains of post-operative nausea and vomiting (PONV) but difference was statistically insignificant (p=0.227).

DISCUSSION

Managing effective post-operative pain is challenging and is an integral component of adequate perioperative care. The analgesic regimen used should be effective, safe, and devoid of side effects. TAP block is a new regional anesthesia analgesia technique, with excellent efficacy after a variety of abdominal surgeries including cesarean section total abdominal hysterectomy, laparoscopic cholecystectomy and hernia repair, open prostatectomy, and open/laparoscopic appendectomy.[2,7,8,9,11] In 2001, within the iliolumbar triangle of Petit Rafi first demonstrated TAP block as an anatomical landmark-based technique.[4] Bounderies of triangle of Petit includes, inferiorly- iliac crest, posteriorly- latissimus dorsi muscle and anteriorly- external oblique muscle. In 2007, Hebbard et al. introduced the USG-guided approach for TAP block.[13] TAP block provide both motor and sensory block to anterio- lateral abdominal wall, and thus used for intra-operative and postoperative analgesia for variety of abdominal surgeries. The efficacy of TAP block was also studied by Belavy et al[2] using Ropivacaine 0.5%.

The results of our study demonstrated that USG-guided TAP block supplemented by parenteral diclofenac and paracetamol was effective in reducing severity of postoperative pain (VAS score), delayed the demand of first postoperative rescue analgesic, and reduced total tramadol consumption during first 24 h after surgery in patients undergoing elective cesarean section under spinal anesthesia. The patients receiving TAP block also had better patient satisfaction score compared to those who did not receive TAP block.

Two similar studies of TAP block were conducted in ASA I and II patients undergoing elective caesarean section under spinal anaesthesia using 20 ml of 0.25% bupivacaine or levobupivacaine. The studies revealed that pain scores were lower and time of demand for first analgesia was significantly longer in study groups compared to control (no drug) groups. [15,15] Another study was conducted using 20 ml of 0.375% ropivacaine on either side, which included ASA II patients undergoing caesarean section under spinal anesthesia; reduction in mean VAS score ($P < 0.001$) and reduced opioid requirement were observed.[16]

In our study, we used USG-guided technique for TAP block to avoid the complications of blind technique. We used tramadol instead of morphine to avoid its complications.[17] We used 0.25% bupivacaine 20 ml on either side and also took care not to exceed the toxic dose that is, 2 mg/kg.

CONCLUSIONS

In our study, we concluded that USG‑guided bilateral TAP block with 0.25% bupivacaine (total 40 mL) reduces the postoperative tramadol consumption and better postoperative VAS score and patient satisfaction score in patients undergoing caesarean section under spinal anaesthesia when spinal opioid was not used.

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