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THE EFFECT OF DEXAMETHASONE ON THE DURATION OF ACTION OF ROPIVACAINE IN TAP BLOCK FOR POST OPERATIVE ANALGESIA IN LSCS

Anaesthesiology

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ABSTRACT

Background A substantial component of post-cesarean pain is somatic pain, arising from the surgical incision on the anterior abdominal wall. Transversus abdominis plane (TAP) block has been described as effective and safe method of post operative pain relief. Adjuvants are frequently added to local anesthetics to prolong analgesia. **Aim of study** To study the effect of dexamethasone as an additive to ropivacaine on the duration of TAP block. Materials and methods A prospective randomized comparative study was undertaken in which one hundred patients undergoing lower segment cesarean section under spinal anesthesia were enrolled and randomly divided into two groups comprising 50 patients each. Study group (GROUP RD) included patients who received USG bilateral TAP block at the end of the surgery with 20 ml of 0.2% ropivacaine plus 2ml (8mg) of dexamethasone on each side. Control group (GROUP R) included patients who received USG bilateral TAP block at the end of the surgery with 20 ml of 0.2% ropivacaine plus 2ml saline on each side. **Results** VAS score in Group R was higher than Group RD in first 24 hours. Time to request for first analgesic in Group R was 8.32±2.403 and in Group RD was 11.76±2.479. The difference was statistically significant; p<0.001.The incidence of nausea and vomiting in Group RD was 28%, which was significantly lower than that in Group R, where it was 48%; p=0.039.The level of satisfaction was higher in Group RD with mean of (8.3±1.69) compared to control group with mean of (5.9±1.64). The difference was highly significant between two groups (p<0.001).**Conclusion** The study has proven that addition of dexamethasone to ropivacaine in ultrasound-guided TAP block in patients undergoing Cesarean section under subarachnoid block significantly prolongs the duration of the block, improves VAS pain scores, reduces pain and vomiting.

KEYWORDS

TAP Block, USG Guided, LSCS, Analgesia,

INTRODUCTION

Most patients who undergo some surgical procedure experience acute post- operative pain and effective post-operative pain control is an essential component of the job of the peri-operative physician. Cesarean section is most performed obstetric operation worldwide[1]. The rate of Cesarean sections is on an increase. Based on the data from 121 countries, an analytical study showed that between 1990 and 2014,the global average CS rate increased 12.4% (from 6.7% to 19.1%) with an average annual rate of increase of 4.4%[2].Cesarean section commonly induces moderate to severe pain for 48 hours, postoperatively[3]. A substantial component of post-cesarean pain is somatic pain, arising from the surgical incision on the anterior abdominal wall. The sensory supply to the skin, muscles, and parietal peritoneum of the anterior abdominal wall is derived from the anterior rami of T7-L1

Local anesthetics are well-recognized to improve the quality of postoperative recovery by reducing pain and analgesics requirements[4].Transversus abdominis plane (TAP) block, a regional anesthesia technique, has been described as an effective and safe component of multimodal postoperative. Several randomized controlled studies have confirmed that single-shot TAP block provides analgesia for up to 48 hours[5]. Adjuvants are frequently added to local anesthetics to prolong analgesia following peripheral nerve blockade[6]. Numerous recent studies have focused on the efficacy of dexamethasone as a local anesthetic adjunct, and it has gained significant popularity in recent years[7]. These studies have included axillary, interscalene, and sciatic blocks, wherein the analgesia induced by various local anesthetics was found to be prolonged with the addition of perineural dexamethasone[7]. The local anesthetics with which dexamethasone has been used as an adjunct and has led to prolongation of the block, include lidocaine, prilocaine, bupivacaine, and ropivacaine[6,7].A retrospective review of1,040patientrecordsfound that when added to ropivacaine, dexamethasone prolonged a range of upper and lower extremity peripheral nerve blocks by a median of 37%[8].

The addition of dexamethasone can similarly prolong the duration of action of ropivacaine in transversus abdominis plane block. In this study, we aim at comparing the effect of perineuraldexamethasone as an additive to ropivacaine with that of ropivacaine alone,on the duration of ultrasound-guided transversus abdominis plane block, inpatients undergoing elective lower segment cesarean section under spinal anesthesia.

AIM OF STUDY

To study the effect of dexamethasone as an additive to ropivacaine on the duration of TAP block.

MATERIALS AND METHODS

This prospective randomized comparative study was conducted in the Department of Anesthesiology and Critical Care, Government Medical College, Srinagar, Kashmir from March 2023 to February 2024 after obtaining written informed consent from all the patients. One hundred patients of ASA grade II aged 18 to 45 years; BMI 18-39.9 kg/square meter, undergoing lower segment cesarean section under spinal anesthesia were enrolled for this randomized control trial.

EXCLUSION CRITERIA:

- Patient refusal to procedure
- Patient with contraindication to regional block
- Thrombocytopenia(Plateletcount<80,000/cumm)
- PatientwithASA Grade>2
- Morbid obesity
- Opioid dependency

The visual analogue scale (VAS) as the method of rating pain was explained to all the patients prior to surgery. Subjects fulfilling the inclusion criteria were randomly assigned either of the two groups comprising 50 patients each.

Group RD (study group) included patients who received ultrasound-guided bilateral TAP block at the end of the surgery with 20 ml of 0.2% Ropivacaine plus 2ml (8mg) of Dexamethasone on each side.

Group R (control group) included patients who received ultrasound-

guided bilateral TAP block at the end of the surgery with 20 ml of 0.2% Ropivacaine plus 2ml saline on each side.

All the enrolled patients underwent lower segment cesarean section under spinal anesthesia with 2.5-3.0 ml of 0.5% Bupivacaine (heavy). At the end of the surgery, bilateral TAP block was performed on each patient, under ultrasound guidance.

TECHNIQUE OF US-GUIDED TAP BLOCK

With the patient supine, the target area was properly draped under all aseptic precautions using 10% betadine solution. A transversely oriented linear ultrasound probe (6-12 MHz) was applied to visualize the antero-lateral abdominal wall where the three muscle layers were most distinct. After identification of the transversus abdominis plane between the internal oblique and transversus abdominis muscles, the probe was moved postero-laterally to lie across the mid-axillary line midway between the costal margin and the iliac crest. A 50mm 23G spinal needle was used in our study. The block needle was introduced anteriorly and advanced in an in-plane approach, the needle tip was directed into the plane between the internal oblique and transversus abdominis muscles and was followed by insertion of 20 ml of 0.2% Ropivacaine with 2 ml of Dexamethasone or normal saline. The TAP block was then performed on opposite side using similar technique. At the end of the procedure, all patients were transferred to postoperative ward.

POST-OPERATIVE ASSESSMENT

Immediately after the performance of TAP block, all the enrolled patients were observed for 1 hour to ensure cardio-respiratory stability. Serial measurements of heart-rate, blood pressure and respiratory rate were taken at every 5 minutes for first 30 minutes, and then every 10 minutes until 1-hour post- procedure. The presence and severity of pain was assessed systematically using Visual Analog Scale (VAS) at 0-hour, 1 hour, 2, 4, 8, 12, 16, 20 and 24 hours. Further, at the end of 24 hrs, patients were evaluated with respect to time to first analgesic (TFA), post-operative nausea/vomiting (PONV) and patient satisfaction. Any patient with a VAS score of more than 3 was given Inj.Diclofenac1.5mg/kg IM to a maximum of three doses in 24 hours; in case of inadequate analgesia patient was given Inj. Tramadol 1mg/kg IV in 50 ml NS infusion corresponding to VAS score of more than5,with maximum of three doses over 24 hours. The time to first request for rescue analgesia was recorded.

RESULTS

Table1:VAS

VAS	Group R		Group RD		P-value
	Mean	SD	Mean	SD	
0Hr	0.18	0.388	0.08	0.274	0.139
1Hr	0.64	0.722	0.48	0.580	0.225
2Hr	1.52	0.707	1.32	0.621	0.136
4Hr	2.62	0.780	1.84	0.766	<0.001*
8Hr	3.52	1.542	2.88	0.872	0.012*
12Hr	1.66	1.836	3.36	1.793	<0.001*
16Hr	1.42	0.906	1.50	1.581	0.757
20Hr	2.32	0.844	2.14	0.969	0.324
24Hr	2.54	1.014	2.46	1.054	0.701

Statistically Significant Difference (P-value<0.05)

Table2:Timeto first analgesic (Hours)

Time to first analgesic (Hours)	Mean	SD	Range	P-value
Group R	8.32	2.403	4-12	<0.001*
Group RD	11.76	2.479	8-16	

Statistically Significant Difference (P-value<0.05)

Table3:Assessmentof patient satisfaction regarding pain management

Patient Satisfaction Score	Mean	SD	Range	P-value
Group R	5.9	1.64	1-8	<0.001*
Group RD	8.3	1.69	3-10	

Table4: Incidence of nausea/vomiting

Nausea/ Vomiting	Group R		Group RD		P-value
	No.	%age	No.	%age	
Yes	24	48	14	28	0.039*
No	26	52	36	72	
Total	50	100	50	100	

VAS score in Group R was higher than Group RD in first 24 hours.
Time to request for first analgesic in Group R was 8.32±2.403 and in Group RD was 11.76±2.479. The difference was statistically significant; p<0.001.

The incidence of nausea and vomiting in Group RD was 28%, which was significantly lower than that in Group R, where it was 48%; p=0.039.

The level of satisfaction was higher in Group RD with mean of (8.3±1.69) compared to control group with mean of (5.9±1.64). The difference was highly significant between two groups (p<0.001).

DISCUSSION

Pregnant ladies undergoing Caesarean section, adequate post-operative analgesia facilitates early ambulation, infant care, (including breast feeding, maternal-infant bonding) and prevention of thromboembolic phenomena and other postoperative morbid conditions. Abdominal wall incision is the major origin of pain experienced by patients after abdominal surgery[9].Transversus abdominis plane (TAP) block, in which analgesia to the skin, muscles of anterior abdomen and parietal peritoneum is obtained10, is one of the new techniques used to block the sensory afferent nerves of the anterior abdominal wall1[1, 12] In this study we used a dose of20ml of 0.2% ropivacaine each side in TAP block, corresponding to a dose of 40mg each side. This dose is well within the recommended safe dose range for ropivacaine. McDonnell JG et al[18] used the maximum recommended dose for ropivacainei.e.150 mg each side. When added as an adjuvant to local anesthetics for different blocks and administration routes, dexamethasone was shown to extend the analgesia time[7]. In a prospective, randomized, double blind study performed on 72 patients by Naghipour et al, [8] mg dexamethasone administrated via the epidural method prolonged the analgesia time by two hours[13]. Movafegh et al described a greater than 2-fold increase in duration of both sensory and motor blockade when dexamethasone [8] mg was combined with lidocaine for axillary block[14].

In our study we observed that at 0 hr, 1 hr, and 2 hr post-operative mean VAS score values at vary insignificantly between the two groups: the reason being the analgesic effect of the TAP block with or without the residual analgesic effect of the sub-arachnoid block. At 4 hr and 8 hr, the VAS scores are significantly higher for Group R than Group D, implying waning of analgesia provided by ropivacaine alone and persistence of analgesia provided by ropivacaine-dexamethasone combination during this period. At 12 hours, VAS scores have reversed between the two groups, being significantly higher in Group RD than Group R because of administration of rescue analgesia earlier in Group R than Group RD. At all subsequent times, the difference in VAS scores between the two groups remains insignificant as rescue analgesia has been now instituted in most of Group RD patients as well.The results of our study show that addition of dexamethasone enhances the analgesic effect of ropivacaine, thereby reducing the observed pain scores significantly at 4 hr and 8 hr. Our results are in conformity with those of Amany S Ammar, Khaled M Mahmoud15(2012), who evaluated the effect of adding dexamethasone to bupivacaine on the quality and duration of transversus abdominis plane (TAP) block and obtained results similar to our study. The results are also in accordance with the study of A. Akkaya et al16(2014), who evaluated the effect of dexamethasone on the block duration added to levobupi vacaine used for transversus abdominis block(TAP)appliedtopatients who underwent caesarean section under spinal anesthesia. The pain scores were lower in the dexamethasone group for superficial pain. A significant difference for the dexamethasone group was observed in the evaluation of deep pain.

In our study we used Inj. Diclofenac IM stat as rescue analgesia in postoperative period of 24 hours. The effect of adding dexamethasone to ropivacaine in Group RD was assessed in terms of the time to request for first rescue analgesia (TFA), which was the primary aim of this study. Time to request for first analgesic in Group R was 8.32±2.403 and in Group RD was 11.76±2.479. The difference was statistically significant; p<0.001.Our results were consistent with the study of Amany S Ammar15(2012) who observed that addition of dexamethasone to bupivacaine in TAP block in abdominal

hysterectomy patients delayed the time to request for firstanalgesic in the dexamethasone group (459.8 min) compared to the plain bupivacaine group (325.4 min; P=0.002). The incidence of nausea and vomiting in Group RD was 28%, which was significantly lower than that in Group R, where it was 48%; p=0.039.Similar to our observation, Amany S Ammar et al15reported lower incidence of nausea and vomiting (6 vs. 14, p=0.03) while using bupivacaine with dexamethasone in TAP block for open abdominal hysterectomy, compared to bupivacaine alone.

Patients' satisfaction with the anesthetic technique 24 hours postoperatively was assessed using the 11-pointvisual analogue scale (0=notsatisfied; 10=fully satisfied). It was observed that patients were showing difference in satisfaction level when compared between two groups. The level of satisfaction was higher in Group RD with mean of (8.3±1.69) compared to control group with mean of (5.9±1.64). The difference was highly significant between two groups ($p<0.001$). Thus, the patients were highly satisfied in study group in postoperative period of 24hours (probably because of reduction in intensity of pain, less post-operative nausea and vomiting).Similar to our results, increased patient satisfaction was reported by Jasleen Sachdeva17on adding dexamethasone to ropivacaine in TAP block for Cesarean section patients. The patient satisfaction with regard to pain relief was 57.14% in ropivacaine group vs 25.71% in ropivacaine with dexamethasone group; p = 0.038.

CONCLUSION

Our study has led us to the conclusion that addition of dexamethasone to ropivacaine in ultrasound-guided TAP block in patients undergoing Cesarean section under subarachnoid block, significantly prolongs the duration of the block, improves VAS pain scores, reduces nausea and vomiting and enhances patient satisfaction.

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