



Anaesthesiology

COMPARISON OF ANALGESIC EFFICACY OF WOUND INFILTRATION WITH COMBINATION OF BUPIVACAINE WITH TRAMADOL VERSUS BUPIVACAINE WITH DEXMEDETOMIDINE FOR POSTOPERATIVE PAIN RELIEF IN CAESAREAN SECTION UNDER SPINAL ANAESTHESIA: A DOUBLE-BLIND RANDOMIZED TRIAL

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ABSTRACT **BACKGROUND:** Wound infiltration is one of the simplest and safe methods for postoperative pain relief in the Caesarean section.

MATERIALS AND METHODS: 60 pregnant women of age group 18–35 years, undergoing elective cesarean section under spinal anesthesia were randomly allocated to Group I (BT, n=30) where patients received wound infiltration with 2mg/kg Tramadol diluted in 30 mL 0.25% Bupivacaine and Group II (BD, n=30) where patients received wound infiltration with 1 µg/kg Dexmedetomidine diluted in 30 mL 0.25% Bupivacaine at the end of surgery. Visual Analogue scale at 0, 2, 4, 6, 8, 12, and 24 hours and any adverse effects with study drugs were assessed during the first 24 hours postoperatively.

RESULTS: The mean VAS score was significantly low in the BD group compared to the BT group at 6 hrs, 8 hrs, and 12 hrs with no significant side effects.

CONCLUSION: A combination of Bupivacaine with Dexmedetomidine provides superior pain relief compared to Bupivacaine with Tramadol.

KEYWORDS : Cesarean Section, Wound Infiltration, Dexmedetomidine, Tramadol

INTRODUCTION

Cesarean section is one of the most frequently performed surgeries in obstetrics. Optimal pain relief of the mother results in early mobilization, initiation of breastfeeding, and prevention of chronic pain syndromes. Wound infiltration with local anesthetics is one of the simplest and widely used methods described for pain relief for many years. Although various drugs have been used for infiltration, very few studies have reported for the combination of Bupivacaine with adjuvants, namely Tramadol or Dexmedetomidine in surgical site infiltration under spinal anesthesia.

The aim of the study was to compare the analgesic efficacy of wound infiltration of Bupivacaine with Tramadol versus Bupivacaine with Dexmedetomidine for postoperative pain relief in the cesarean section under spinal anesthesia.

MATERIALS AND METHODS

After obtaining Institutional Ethical Committee approval, 60 pregnant women, between 18 and 35 years age, belonging to the American Society of Anesthesiologists physical status I or II undergoing elective cesarean section under spinal anesthesia were included in the study. Patients with severe cardiopulmonary, renal or liver disease, pre-eclampsia, eclampsia, morbidly obese, allergic to study drugs were excluded from the study. During the preoperative visit, a detailed history and examination of the patients were done. Informed written consent was obtained. All patients were counseled and educated about reporting the intensity of postoperative pain using the Visual Analogue scale-(VAS).

Routinely complete haemogram, urine for routine tests and microscopy, random blood sugar, blood urea, serum creatinine were performed for all the patients as an institutional protocol. All patients received tablet ranitidine 150 mg and tablet Metoclopramide 10 mg the night before surgery and intravenous (IV) ranitidine 50 mg and IV Metoclopramide 10 mg before induction of anesthesia as per the institutional protocol.

Patients were randomly divided into two groups of 30, each using computer generated random numbers. The computer generated group numbers were enclosed in a sealed envelope by a neutral observer who was not involved in the study. After the sealed envelope was opened, the same observer prepared the drug for wound infiltration.

Patients belonging to group BT received Surgical site infiltration with 2mg/kg Tramadol diluted in 30ml of 0.25% Bupivacaine while those

belonging to group BD received 1µg/kg Dexmedetomidine diluted in 30ml of 0.25% Bupivacaine.

In the operating room, patients were monitored with pulse-oximeter (SpO₂), electrocardiogram, and non-invasive blood pressure. All patients were preloaded with Ringer lactate 10 mL/kg. Lumbar puncture was performed with a 25 G Quincke spinal needle in sitting position at the L3/4 position. Subarachnoid block was established with 2.0 ml hyperbaric Bupivacaine 0.5%.

At the end of the surgical procedure but before closure of the surgical wound, the surgeon was asked to infiltrate all layers of the surgical incision using 22-gauge, 1.5-inch needle using study drugs, with 10 mL injected into the peritoneal plane, 10 mL injected into the musculofascial plane, and 10 mL injected into the subdermal plane.

In the postoperative period, assessments were made for postoperative analgesia after shifting the patient to the postoperative ward (0hr) as a baseline then at 0hr, 2hr, 4hr, 6hr, 8hr, 12hr, and 24 hr. The primary observation was to compare pain [Visual Analogue scale-(VAS)]. The secondary observation was the time at which the rescue analgesia inj. diclofenac 75mg i.m. was given and the total dose of analgesic given in the first 24 hours postoperatively and to observe any adverse effects of wound infiltration with the study drugs like hypotension, bradycardia, nausea, vomiting, and pruritus.

The observed data during the preoperative period, intraoperative period, and postoperative period were tabulated and analyzed statistically.

STATISTICAL ANALYSIS

Data were analyzed using Statistical Package for the Social Sciences (SPSS) version 20. Results were expressed as mean ± standard deviation (SD). Categorical data were analyzed using the Chi-square test. Quantitative or continuous variables were presented as mean ± SD and compared using the student's t-test. P < 0.05 was considered statistically significant.

RESULTS

Sixty patients were enrolled in the study, and all the patients completed the study. There was no significant difference between the groups with regard to age, weight, and height.

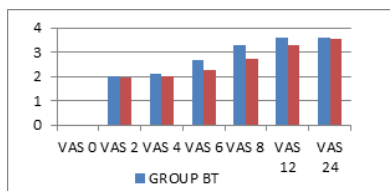
Table no.1: DEMOGRAPHIC PROFILE

PARAMETER	GROUP BT	ROUP BD	P VALUE
AGE (YEARS)	39.3 ± 12.09	38.17 ± 10.52	0.6999 NS

HEIGHT (CMS)	158.53 ± 5.89	157.87 ± 5.03	0.6392	NS
WEIGHT (KGS)	66.5 ± 8.69	66.03 ± 7.93	0.8289	NS

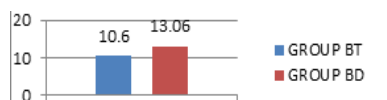
There was no significant difference in VAS scores between these two groups until 4 hours. The mean VAS score was significantly low in BD group compared to BT group at 6 hrs, 8 hrs and 12 hrs with mean VAS score of 2.67 ± 0.479 vs 2.27 ± 0.449 , 3.27 ± 0.691 vs 2.7 ± 0.466 and 3.6 ± 0.498 vs 3.3 ± 0.466 with P value of 0.0015, 0.004 and 0.0192 respectively which are < 0.05 .

CHART NO. 1: COMPARISON OF MEAN VAS SCORE OVER 24 HOURS:



Time to reach a visual analog scale (VAS) ≥ 4 was significantly longer in the BD group compared to the BT group. The Time to reach VAS ≥ 4 or time to give 1st rescue analgesia was 10.6 ± 1.631 hours in the BT group and 13.067 ± 1.574 in the BD group. P-value is < 0.05 , which is statistically significant.

CHART NO. 2: TIME TO GIVE 1ST RESCUE ANALGESIA IN HRS



In group BT (n = 30), six patients required single dose of rescue analgesia, 24 patients required two doses of rescue analgesia. In group BD (n = 30), 21 patients required single dose of rescue analgesia, patients required two doses of rescue analgesia, P value 0.000 which was significant.

There were no significant changes in hemodynamic parameters over 24 hrs. In both groups, the mean hemodynamic parameters (heart rate, systolic blood pressure, diastolic blood pressure, SPO2, and respiratory rate) at (0,2,4,6,8,12 and 24) hours were comparable. P-value > 0.05 was statistically insignificant.

Two patients in group BT had nausea and which is clinically and statistically insignificant, and there were no cases reported with other side effects like hypotension, bradycardia, drowsiness, and pruritus in either of study groups.

DISCUSSION

Single shot spinal anesthesia is the most commonly employed anesthesia technique for elective cesarean section. Such patients experience moderate to severe pain in the postoperative period. One of the multimodal approach for postoperative pain control includes inhibition of pain impulses originating from peripheral nerves innervating the surgical site by infiltration with local anesthetic alone or added with adjuvants, which can improve the quality and duration of analgesia.

In this study, two adjuvants, namely Tramadol or Dexmedetomidine, along with Bupivacaine, were compared for local infiltration for postoperative analgesic effects.

Bupivacaine has been used as the local anesthetic of choice for a long time.

Tramadol is a synthetic analog of codeine that acts through the mechanism of action of both opioids (weak opioid receptor agonist) and nonopioids (noradrenaline, which prevents the reuptake of serotonin). When added as an adjuvant to the local anesthetic agent, it can modify the effects of local anesthetic by directly or indirectly affecting sodium channels, thus contributing to a better analgesic effect.

Dexmedetomidine is a potent α_2 adrenoreceptor agonist that can potentiate and prolong the duration of local anesthetic wound infiltration for pain relief. However, only limited data are available for

the use of Dexmedetomidine as an adjuvant to local infiltration of the surgical wound.

In our study, both the groups were statistically comparable with respect to demographic profiles, which avoid variations in intraoperative and postoperative outcomes of patients. None of the patients were excluded from our study.

In our study, the VAS score did not differ significantly between the two groups until 4 hours, but the VAS score was significantly low in BD group compared to BT group at 6 hrs, 8 hrs and 12 hrs with P value < 0.05 which was comparable with fewer studies like Roopa Sachidananda et al¹⁶ and Shaman Bhardwaj et al¹⁹. However, better pain scores were achieved in the BT group compared to few studies like Shekoufch Behdad et al⁹, and Yavuz Demiraran et al¹⁰ and pain scores were higher in the BD group compared to few studies like Jyothi B et al.¹⁸

The time to give 1st rescue analgesia in our present study was comparable with Roopa Sachidananda et al¹⁶ where it was 386.17 ± 233.84 min. in the BT group. However there were few studies where time to reach VAS ≥ 4 was significantly longer compared to our present study like E Niyirera et al¹⁷ it was more than 12 hours for BT group, and in Jyothi B et al¹⁸ study it was 23.4 hrs in Levobupivacaine with Dexmedetomidine group.

In group BT, there were 6 patients reported to have a single dose of rescue analgesia, and 24 patients required two doses of rescue analgesia whereas in group BD, 21 patients required a single dose of rescue analgesia and 9 patients required two doses of rescue analgesia. Thus the demand for rescue analgesic consumption was significantly less in BD group compared to BT group which was evidenced by the Mean value of total doses of rescue analgesic consumption in 24 hrs (1.3 ± 0.467 in Group BD vs. 1.8 ± 0.407 in BT group, p-value 0.000) which were comparable with Ayse Ulgey et al¹¹ and Kadir Ozyilmaz et al⁷

There was no significant changes in hemodynamic parameters over 24 hrs and the mean hemodynamic parameters (heart rate, systolic blood pressure, diastolic blood pressure, SPO2 and respiratory rate) at (0,2,4,6,8,12 and 24) hours in both groups with P-value > 0.05 which was statistically insignificant which were comparable with Shaman Bhardwaj et al.¹⁹

There were 2 patients reported with nausea in group BT, and there are no other side effects like hypotension, bradycardia, drowsiness and pruritus in either of study groups, which were comparable with previous studies^{7,14,16,19}.

CONCLUSION

The quality of analgesia in this study as evidenced by a reduction in pain scores and decreased rescue analgesic demand, stable hemodynamics, and no significant adverse effects.

Thus, Dexmedetomidine and Tramadol seem to be an attractive adjuvant to Bupivacaine for surgical site infiltration in patients undergoing abdominal surgeries; however, the combination of Bupivacaine with Dexmedetomidine provides superior pain relief compared to Bupivacaine with Tramadol.

REFERENCES

- Casey WF, Rice J, Haussallah RS. Subcutaneous wound infiltration have been shown to reduce post operative pain. Br J Anesth 1994;72:229-38.
- Stoelting RK. Pharmacology & Physiology in Anaesthetic Practices, 3rd Edition, Philadelphia, New York, Lippincott Raven, 1999.
- Miller Ronald D. Anaesthesia, 5th Edition, Vol.1 Philadelphia, Churchill livingstone, 2000
- Lütfiyep İrbudak et al. Single perioperative wound infiltration with combination of Bupivacaine, Tramadol, and tenoxicam for pain relief after caesarean delivery with spinal anesthesia. The Pain Clinic. 2004; 16(3): 287-291.
- Abdullah M. Kaki, Waleed Al Marakbi. Post-hermiorrhaphy infiltration of Tramadol versus Bupivacaine for postoperative pain relief: a randomized study. Ann Saudi Med. 2008; 28(3): 165-168.
- Manpreet Kaur, P. M. Singh. Current role of Dexmedetomidine in clinical anesthesia and intensive care. Anesthesia: Essays and Researches. 2011; 5(2): 128-33.
- Kadir Ozyilmaz et al. Postoperative Analgesic Effects of Wound Infiltration With Tramadol and LevoBupivacaine in Lumbar Disk Surgeries. J Neurosurg Anesthesiol 2012;24(4):331-335.
- Udita Naithani, Indira Kumari, Rekha Roat, Vinita Agarwal, Chayenika Gokula, Harsha, Vimla Doshi. Efficacy of wound infiltration using Bupivacaine versus ropivacaine along with fentanyl for postoperative analgesia following abdominal hysterectomy under spinal anesthesia. Anesth Pain Med. 2013; 2(34): 6478-6489.
- Behdad S, Sekhavat L, Ayatollahi V, Meshkat F, Mortazavi A. Comparison of postoperative analgesic effect of Tramadol and Bupivacaine subcutaneous infiltration in

- patients undergoing caesarean section. *Acta Clin Croat.* 2013; 52(1): 93-97.
10. Yavuz Demiraran, Mustafa Albayrak et al. Tramadol and levoBupivacaine wound infiltration at Caesarean delivery for postoperative analgesia *J Anesth.* 2013;27:175-179.
 11. Ayse Ulgey, Işın Güneş, Adnan Bayram, Cihangir Bicer, Fatih Mehmet Kurt, Ipek Müderis, Adem Boyac. The Analgesic Effects of Incisional LevoBupivacaine with Dexmedetomidine after Total Abdominal Hysterectomy. *Erciyes Med J* 2015; 37(2); 64-68.
 12. Abd El Monsef Abd El Hamed Sedek And Farid Ahmed Kassab. The Effectiveness Of Local Anesthetic Wound Infiltration In Post Cesarean Section Pain Relief. *Al-Azhar Assiut Medical Journal.* 2015 ; 13 (1): 152-162.
 13. Girish P. Joshi et al. Surgical Site Infiltration for Abdominal Surgery: A Novel Neuroanatomical-based Approach. *Plast Reconstr Surg Glob Open* 2016;4(12): e118
 14. Swati Singh, Chandrakant Prasad. Post-operative analgesic effect of Dexmedetomidine administration in wound infiltration for abdominal hysterectomy: A randomized control study. *Indian J Anaesth* 2017; 61(6):494-498.
 15. Mohammad Ali Sahmeddani, MD; Simin Azemati, MD; Ehsan Masoudi Motlagh, MD. Local Infiltration of Tramadol versus Bupivacaine for post caesarean section pain control: A Double-Blinded Randomized study. *Iran J Med Sci.* 2017; 42(3): 235-241.
 16. Roopa Sachidananda, Vikas Joshi, Safiya I. Shaikh, G. Umesh, T. Mrudula, M. Maruthesh. Comparison of analgesic efficacy of wound infiltration with Bupivacaine versus mixture of Bupivacaine and Tramadol for postoperative pain relief in caesarean section under spinal anaesthesia: A double-blind randomized trial. *J Obstet Anaesth Crit Care.* 2017; 7(2):85-89.
 17. E Niyirera, AKiswezi, F Ntirenganya. Postoperative Pain Control in Inguinal Hernia Repair: Comparison of Tramadol Versus Bupivacaine in Local Wound Infiltration: A Randomized Controlled Trial. *East & Central African Journal of Surgery* 2017; 22 (1): 80-87.
 18. Jyothi B, Kirthiha Govindaraj, Pratishruthi, Safiya I Shaikh. Comparison of Analgesic Efficacy of LevoBupivacaine, LevoBupivacaine and Clonidine, and LevoBupivacaine and Dexmedetomidine in Wound Infiltration Technique for Abdominal Surgeries: A Prospective Randomized Controlled Study. *Indian J Pain* 2017; 31 (2): 127-32.
 19. Shaman Bhardwaj, Sumeet Devgan, Dinesh Sood, Sunil Katyal. Comparison of Local Wound Infiltration with Ropivacaine Alone or Ropivacaine Plus Dexmedetomidine for Postoperative Pain Relief after Lower Segment Cesarean Section. *Anesthesia: Essays and Researches.* 2017; 11 (4): 940-945
 20. Ritika Deshwal, Nidhi Kumar, Jagdish Prasad Sharma, Ranjit Kumar. Efficacy of Dexmedetomidine Added to Ropivacaine Infiltration on Postoperative Pain following Spine Surgeries: A Randomized Controlled study. *Anesthesia: Essays and Researches.* 2018; 12(3): 700-704.