### Journal of Advanced Medical and Dental Sciences Research

@Society of Scientific Research and Studies

Journal home page: www.jamdsr.com

doi: 10.21276/jamdsr

ICV 2018= 82.06

(e) ISSN Online: 2321-9599;

(p) ISSN Print: 2348-6805

# **O**riginal **R**esearch

## To compare the effects of transversus abdominis plane block with ropivacaine versus bupivacaine on post-operative analgesia in patients experiencing lower segment caesarean section deliveries

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#### ABSTRACT:

Aim: To compare the effects of transversus abdominis plane block with ropivacaine versus bupivacaine on post-operative analgesia in patients experiencing lower segment caesarean section deliveries. **Material and methods:** The Department of Anaesthesiology undertook this prospective, single-blind, randomised, comparative investigation. A prospective, randomised, double-blind, controlled clinical trial including 66 American Society of Anaesthesiologists (ASA) I and II patients aged 20 to 42 years old was conducted over a 6-month period. TAP block with either injection bupivacaine 0.2% 15 ml + injection dexamethasone 2mg each side in group B (n = 33) or injection ropivacaine 0.2% 15 ml + injection dexamethasone 2mg each side in group R (n = 33). **Results**: The demographic statistics in both groups were equivalent in our research of 66 participants. The average age was  $24.22\pm4.28$  years. Demographic characteristics, baseline pulse rate, mean arterial blood pressure, and surgical time were equivalent in both groups (Table 1). Before executing the block, baseline pulse rate and mean arterial blood pressure throughout the study interval were greater in Group B than in Group R, albeit both were within acceptable physiological ranges. There was a significant difference at 2 and 4 hours (p<0.05). The time for rescue analgesia in Group B was shorter than in Group R, at 6.8 h and 9.33 h, respectively. **Conclusion:** When administered in TAP block for postoperative analgesia in lower segment caesarean section births, 0.2% Ropivacaine offered a longer duration of analgesia than 0.2% Bupivacaine.

Keywords: transversus abdominis plane block, ropivacaine, bupivacaine, post-operative analgesia

Received: September 21, 2019

Accepted: October 25, 2019

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**This article may be cited as:** Wadhwa S. To compare the effects of transversus abdominis plane block with ropivacaine versus bupivacaine on post-operative analgesia in patients experiencing lower segment caesarean section deliveries. J Adv Med Dent Scie Res 2019;7(11):271-274.

#### **INTRODUCTION**

With a growing incidence of 8.5% (NFHS-3) to 17.2%, Caesarean section is the most often performed obstetric surgery (NFHS-4).<sup>1</sup> One of the most common concerns during and after abdominal surgery is postoperative discomfort. <sup>2</sup> Inadequate postoperative pain treatment reduces ambulation, nursing, and even mother bonding, whereas appropriate analgesia promotes breastfeeding, infant weight growth, and ambulation. <sup>3,4</sup>

Opioids are the gold standard choice of analgesia in the postoperative period, but when used after a caesarean section, they are frequently associated with a number of undesirable side effects such as nausea, vomiting, sedation, urinary retention, respiratory depression, and prolonged postoperative ileus. <sup>5-7</sup> Other modalities of analgesia are required to offset the negative effects of opioids.

Infiltration of local anaesthetic into the surgical site is widely utilised as part of multi-modal analgesia regimens. <sup>8</sup> Wound infiltration with local infiltration for post-caesarean section analgesia has been shown in studies to be useful in lowering opiate intake. However, the use of local anaesthetic wound infiltration for post-operative pain relief has been investigated in previous decades, with inconsistent data and experts holding fundamentally diverse perspectives on the subject. Furthermore, the majority of published research found no substantial reduction in pain levels. <sup>9-11</sup> Transversus Abdominis Plane (TAP) block has grown in favour as an analgesic method during the last decade. Rafi12 officially documented transversus abdominis plane block in 2001. TAP block includes using ultrasound or anatomical landmark guidance to inject local anaesthesia into the fascial plane between the internal oblique and transversus abdominis muscles, where the thoraco-lumbar nerves T6-L1 run innervating the anterior abdominal wall. In most lower abdominal procedures, the TAP block approach has been proved to be a safe and effective postoperative supplementary analgesic strategy. 13,14 TAP block has several advantages, including avoiding neuraxial analgesia treatments and their associated risks, reducing post-operative opioid intake, and increasing patient satisfaction. <sup>6,7</sup> In order to examine the effects of transversus abdominis plane block with ropivacaine versus bupivacaine on post-operative analgesia in patients undergoing lower segment caesarean section births, we conducted a research.

#### MATERIAL AND METHODS

After receiving clearance from the protocol review committee and the institutional ethics committee, this prospective, single-blind, randomised, comparative study was carried out in the Department of Anaesthesiology. A prospective, randomised, doubleblind, controlled clinical trial including 65 American Society of Anaesthesiologists (ASA) I and II patients aged 20 to 42 years was conducted over a 6-month period.

Exclusion criteria included patient refusal. contraindications to spinal anaesthesia, local anaesthetic sensitivity, morbid obesity, known comorbidities (pregnancy-induced hypertension, postpartum haemorrhage, anaemia, gestational diabetes hypothyroidism), insufficient mellitus, spinal anaesthesia, intraoperative hemodynamic instability, and those who required general anaesthesia. TAP block with either injection bupivacaine 0.2% 15 ml + injection dexamethasone 2mg each side in group B (n = 33) or injection ropivacaine 0.2% 15 ml + injection dexamethasone 2mg each side in group R (n = 33). The allocation was concealed from the patients, anesthesiologists, and staff.

Following a thorough pre-anaesthetic examination, all patients were informed about the Visual Analogue Score (VAS) for pain in their native language and were electively fasted for 8 hours before to surgery.

Standard monitoring, including an electrocardiogram, non-invasive blood pressure, and arterial oxygen saturation, was employed throughout the operating room, and two wide bore venous access points were **Table 1 Demographic profile of the patients** 

obtained. Intravenous ranitidine 50mg and ondansetron 8mg were given to the patients as a premedication. Ringer Lactate (500 mL) was preloaded into the patients. In a sitting posture with no table tilt, all patients got a standardised spinal anaesthetic with 0.5% hyperbaric bupivacaine 2.2 ml without any additive. Pinprick was used to assess the block. T6 was the target height. Intraoperatively, patients were monitored. Hypotension was defined as a drop in systolic blood pressure that was greater than 30% of the baseline value and was treated with incremental doses of Inj. mephenteramine 6 mg and a bolus of 200 ml Ringer Lactate. Bradycardia was defined as a heart rate of 50 beats per minute and was treated with 0.6 mg of atropine injection. No analgesics or sedatives were administered to any of the patients during surgery.

The anaesthesiologist who watched the patients in the PACU was unaware of the medication given during TAP block. Patient was monitored every 15 minutes for an hour, then every 2 hours in the PACU, then every 4, 8, 16, 24, 48 hours postoperatively for pulse rate, blood pressure, discomfort, and problems, if any. The pain was graded using the Visual Analogue Scale (0 = no pain, 10 = greatest conceivable agony). At a VAS score of 4, the patient was administered rescue analgesia in the form of inj. tramadol 50 mg iv (i.e. moderate pain). The Modified Bromage Scale detected remission of motor block during spinal anaesthesia. The duration of analgesia was defined as the period from TAP block injection to a VAS score of 4. At the time of discharge, the patient's satisfaction with pain treatment was assessed on a scale of 0 to 10. The patient was also checked for any additional postoperative problems such as haematoma, flank fullness, edoema at the injection site, and so on.

#### RESULTS

The demographic statistics in both groups were equivalent in our research of 66 participants. The average age was  $24.22\pm4.28$  years. Demographic characteristics, baseline pulse rate, mean arterial blood pressure, and surgical time were equivalent in both groups (Table 1). Before executing the block, baseline pulse and blood pressure were taken into account, and there was no significant difference between the two groups. The pulse rate and mean arterial blood pressure throughout the study interval were greater in Group B than in Group R, albeit both were within acceptable physiological ranges. There was a significant difference at 2 and 4 hours (p<0.05). The time for rescue analgesia in Group B was shorter than in Group R, at 6.8 h and 9.33 h, respectively.

Demographic profile	Group B (n=33)	Group R (n=33)
Age(Years)	$23.02 \pm 4.22$	$25.55 \pm 4.36$
Weight (KG)	$66.5 \pm 4.36$	$67.5\pm3.69$
Height (cm)	$153.2 \pm 3.2$	$153.2\pm2.2$
Baseline Pulse (Per Min)	88.11 ±8.96	$86.58 \pm 8.36$
Baseline Mean Arterial	$91.66 \pm 4.36$	$90.36\pm5.87$

Blood Pressure (mmHg)		
Duration of Surgery (min)	$50.23 \pm 5.74$	$49.85 \pm 4.63$

Similarly mean Visual Analog Score (VAS) was observed lower in Group R throughout the entire duration of study Table 2.

Table 2

Time	Ropivacaine	Bupivacaine
Baseline	0	0
15 min	0.3	0.3
30 min	0	0.3
45 min	0.4	0.3
1 Hour	0.4	0.4
2 Hour	0.5	1.1
4 Hour	1.4	2.2
8 Hour	3.4	3.2
16 Hour	3.3	1.9
24 Hour	3.0	3.3

Comparatively higher hemodynamic stability, longer duration of analgesia with less doses of rescue analgesics lead to higher patient satisfaction score seen in Group R. Swelling and pain at the site of injection was a complication noted, in one subject in each group.

#### DISCUSSION

There are some differences in pain following a caesarean birth. Surgery-related pain, which is usually described as "aching," is largely localised to the operative Postoperative analgesia site. is advantageous since it has been shown to reduce postoperative stress response, morbidity, and contribute to a better surgical result. A multimodal analgesic regimen is most often utilised to attain these objectives. However, the best components of a multimodal analgesic regimen are still being developed. 15

Multimodal analgesia is a method of treating pain by using numerous mechanisms at different points along the pain pathway. We can provide considerable postoperative analgesia in patients having abdominal procedures by directly blocking the afferent nerve supply of the abdominal wall with methods such as abdominal field blocks, ilioinguinal, and hypogastric nerve blocks. TAP blocks are one example of a riskfree treatment for postoperative multimodal analgesia. Because the transversus abdominus plane contains fewer blood arteries than other peripheral nerve block techniques, the danger of vessel puncture, intravascular injection, and systemic toxicity of the local anaesthetics is decreased. The ease of the process for clinical usage provides a technological benefit. It is best accomplished by combining longacting local anaesthetics with an adjuvant. 16 Other than caesarean section, TAP block has been utilised for large bowel resection, open/laparoscopic appendectomy, complete abdominal hysterectomy, laparoscopic cholecystectomy, open prostatectomy, abdominoplasty with or without flank liposuction, inguinal hernia, and iliac crest bone transplant. 17-24

Champaneria R et  $al^{25}$  did a meta-analysis to determine the efficacy of TAP blocks for immediate pain management after caesarean delivery. It evaluated 20 trials and concluded that TAP blocks

decreased pain at rest considerably more than placebo or no TAP blocks (p=0.008) and intrathecal morphine (p<0.0001). Both of these comparisons revealed the highest improvement with pain on movement (p=0.005 and p<0.00001, respectively). TAP blocks significantly reduced morphine intake when compared to placebo or no TAP blocks (p<0.00001). A.Z. El Abdein Mohamed<sup>26</sup> conducted a research in which bilateral 20 ml of ropivacaine 0.2% in TAP block gave postoperative analgesia comparable to bilateral 20 ml of ropivacaine 0.5% in TAP block following caesarean birth given under general anaesthesia. We utilised 0.2% ropivacaine and 0.2% bupivacaine in our investigation. Sirvasta et al. <sup>27</sup> evaluated the role of TAP block as a component of multimodal postoperative analgesia in 62 pregnant women planned for caesarean birth in a randomised doubleblind research. TAP block substantially reduced pain score at all study periods during rest and activity, as well as parturient tramadol use via patient-controlled analgesia. TAP block provided excellent analgesia and decreased the need for intravenous tramadol after surgery in our investigation. McDonnell et al. 28 investigated the efficacy of TAP block with ropivacaine for postoperative analgesia in caesarean deliveries conducted under spinal anaesthesia, and they discovered that TAP block significantly reduced pain score and 48-hour morphine use. In our study, the overall intravenous analgesic need was lowered, and the patients had lower pain scores 24 hours after surgery.

#### CONCLUSION

This study concludes that 0.2% Ropivacaine provided a longer duration of analgesia compared to 0.2% Bupivacaine when used in TAP block for postoperative analgesia in lower segment caesarean section deliveries.

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