

## ORIGINAL ARTICLE

# Comparison of Dexmedetomidine and Magnesium Sulphate as an Adjuvant to Bupivacaine for Transverse Abdominis Plane Block In Caesarean Delivery for Post Operative Analgesia

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## ABSTRACT

**Introduction:** Postoperative pain relief can be achieved by a variety of techniques including peripheral nerve block, parenteral NSAIDS, epidural analgesia, neuraxial local analgesics. The transverse abdominis plane block is a local anaesthetic block used to provide analgesia to the anterior and lateral abdominal wall.

**Methods:** The prospective randomised study carried out in 90 patients belonging to ASA 1, 2 posted for LSCS and divided into 3 groups,30 patients each. All patients receive TAPP block at the end of surgery. Group B received TAPP block with 18 ml 0.25% bupivacaine 18ml with 2ml NS. Group BM received 0.25% bupivacaine with 1.5ml (150mg) of magnesium sulfate and 0.5ml of NS. Group BD received 20ml of bupivacaine with dexmedetomidine 0.5 mcg/kg with 2ml NS.

**Results:** Combination of 0.25% bupivacaine and 150mg magnesium sulfate and combination of 0.25% bupivacaine and 0.5mcg/kg dexmedetomidine provides longer duration of analgesia compared to 0.25% bupivacaine alone.

**Conclusion:** Maximum duration of analgesia observed with combination of 0.25% bupivacaine and magnesium sulfate 150mg.Thus TAPP block when used as a part of multimodal regime provided superior analgesia up to 48 hours and reduced the need of opioid analgesia following LSCS under spinal anaesthesia.

**Keywords:** Transverse abdominis plane block, Bupivacaine, Magnesium sulfate, dexmedetomidine.

## INTRODUCTION

Pain has been defined as an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage.<sup>1</sup>

Lower segment caesarean section surgery is often painful and requires aggressive management. Postoperative pain relief can be achieved by a variety of techniques including peripheral nerve block, parenteral NSAIDS, epidural analgesia, neuraxial local analgesics and narcotics, wound infiltration and patient controlled IV analgesia with opioids. The Transversus Abdominis Plane (TAP) Block is a local anaesthetic block used to provide analgesia to the anterior and lateral abdominal wall. Rafi et al. (2001)<sup>2</sup> was the first to describe this novel abdominal field block. He described an anatomical landmark technique and provided evidence of blockade to the mid/lower thoracic and upper lumbar spinal nerves as they travelled in the fascial plane between the transversus abdominis and internal oblique muscles. So, in this study we assess the efficacy of TAP block for postoperative analgesia in lower segment caesarean section surgery. We compare Dexmedetomidine and Magnesium sulphate as an adjuvant to bupivacaine in

TAP block for postoperative analgesia, in patients undergoing caesarean section surgery. We find that Combination of 0.25% bupivacaine and 150mg magnesium sulphate and combination of 0.25% bupivacaine and 0.5mcg/kg dexmedetomidine provides longer duration of postoperative analgesia compared to 0.25% bupivacaine alone.

## AIM AND OBJECTIVES

Aim of study was to compare Dexmedetomidine and Magnesium sulphate as an adjuvant to bupivacaine in TAP block for postoperative analgesia, in patients undergoing caesarean section surgery. The objective included were to study the effectiveness of transversus abdominis plane block for post-operative analgesia in caesarean section surgery; to assess the duration of analgesia conferred by 0.25% bupivacaine alone, 0.25% bupivacaine plus 0.5mcg/kg dexmedetomidine and 0.25% bupivacaine plus magnesium sulphate 150mg; total requirement of rescue analgesia after TAPB in all three group and to watch for occurrence of side effects, if any.

## MATERIALS AND METHOD

After approval from the Institutional Ethical Committee, the study was conducted in 90 adult parturient patients scheduled for elective lower segment caesarean section (LSCS) in SMIMER, Surat.

Detailed history and preoperative assessment was carried out before operation in prescribed proforma with preformed consent of patients. A prospective, randomized controlled study was conducted. All patients were administered spinal anaesthesia with bupivacaine heavy 0.5%, 2.2-2.5ml with 25 G spinal needle at L2-L3 or L3-L4 vertebral interspace. The patients were randomly allocated in three groups of thirty patients each and study drug was injected at the end of surgery according to the group. The volume of administered drug kept constant (20 ml).

### Groups:

**Group B (n=30):** Patients received TAP BLOCK on either side with 18ml 0.25% Bupivacaine in which 2ml normal saline added.

**Group BM (n=30):** Patients received TAP BLOCK on either side with 18ml 0.25% Bupivacaine mixed with 1.5ml (150mg) of MGSO<sub>4</sub> and 0.5ml NS.

**Group BD (n=30):** Patients received TAP BLOCK on either side with 18ml 0.25% Bupivacaine mixed with 2ml of NS in which dexmedetomidine 0.5mcg/kg added.

Visual Analogue scale (VAS) 10 points was used to assess post-operative analgesia. After securing intravenous line, all patients were preloaded with Inj. Ringer Lactate 10 – 15 ml/kg. Patients were premedicated with inj. Glycopyrrolate 0.2mg i.v and inj. Ondansetron 4mg i.v. half an hour before operation. On operation table, baseline pulse, blood pressure and saturation of oxygen were recorded.

### Method of transversus abdominis plane block:

In supine position the lumbar triangle of Petit (formed anteriorly by External oblique muscle, posteriorly by Lattisimus dorsi muscle and inferiorly by iliac crest) was identified.

A 22 gauge, 5-8 cm long blunt tipped short bevelled needle was inserted in this triangle, just posterior to the mid-axillary line perpendicular to skin. A pop was felt when the needle passed through the fascial extensions of the external oblique muscle i.e. the tip was between the fascial layers of the external oblique muscle and the internal oblique muscle. A second pop indicated that the needle was in the fascial plane above the transversus abdominis muscle. 20 ml of the local anaesthetic solution was injected in this plane after negative aspiration. Same procedure repeated on other side. Each patient was assessed at 0, 4, 8, 12,

24, 36 and 48 hour after surgery by an independent observer for pain at rest and on movement using visual analog scale, time of first demand for tramadol, total consumption for tramadol, satisfaction with pain management and side-effects.

### In the postoperative period,

Inj. Tramadol 50 mg IV was given, when VAS > 4 and repeated after 6 hours, when patient complained of pain persistently. The time of first analgesic, total doses of analgesics within 48 postoperative hours and any side effects were also recorded. Statistical analysis was done by using unpaired 't' test.

In the study, all patients received spinal anaesthesia with 25 G spinal needle with 2.2-2.5ml, 0.5% bupivacaine heavy at L2 – L3 or L3 – L4 vertebral interspace. Transversus Abdominis Plane Block (TAP Block) was administered at the end of surgery. Post operatively, patients were observed at different intervals at 0, 4, 8, 12, 24, 48 hours.

## OBSERVATION & RESULTS

The prospective, randomized study was carried out in 90 patients, scheduled for elective lower segment caesarean section in SMIMER, Surat. The patients were randomly allocated in three groups of 30 patients each. The patients belonging to each group received the following drugs in Transversus Abdominis Plane Block (TAP Block) at the end of surgery.

The age of patient in each group is below 30 and weight is between 55-60 kg. In group B, mean duration of surgery was 60.50 ± 11.47 minutes whereas in group BD, it was 58.00 ± 7.26 minutes and in group BM it was 61.33 ± 12.66 which was comparable in three groups.

In group B, preoperative pulse was 104.33 ± 8.47 per minute whereas in group BD it was 98.27 ± 9.15 per minute and in group BM it was 106.87 ± 9.96. In group B, systolic blood pressure was 115.00 ± 13.83 mm of Hg whereas in group BD it was 119.47 ± 9.11 mm of Hg and in group BM it was 114.00 ± 8.94. In group B diastolic blood pressure was 75.33 ± 7.30 mm of Hg whereas in group BD, it was 77.80 ± 5.16 mm of Hg and in group BM it was 74.67 ± 5.07. In group B, preoperative respiratory rate was 16.13 ± 1.04 per minute whereas in group BD, it was 16.50 ± 1.11 per minute and in group BM, it was 15.90 ± 0.92 per minute. Hemodynamically all three groups were comparable. Pulse rate, Systolic and Diastolic blood pressure in three groups at different time intervals from the time of performing the TAP block to 48 hours showing no significant difference p-value > 0.05.

Visual Analogue Score (VAS) in three groups at different time intervals at rest, from the time of per-

forming the TAP block to 4,8,12,24,48 hours and significant difference is observed. There was highly significant difference in mean VAS at 4, 8, 12, 24, 48 hr in all three groups (P-value <0.001) (Table 1). After 8hr no statistically significant difference between group BD and BM but statistically significant difference was observed between B and BD, B and BM.

of performing the TAP block to 4,8,12,24,48 hours also shows significant difference in mean VAS at 4, 8, 12, 24, 48 hr in all three groups (P-value<0.001). After 8hr no statistically significant difference between group BD and BM but statistically significant difference was observed between B and BD, B and BM.

Visual Analogue Score (VAS) in three groups at different time intervals during movement from the time

**Table 1: Mean Post-Operative Visual Analogue Score (VAS) At Rest**

	B Group		BD Group		BM Group		P Value	P Value between different groups		
	Mean	SD	Mean	SD	Mean	SD		BVs.BD	BDVs.BM	BVs.BM
Immediate after TAP Block at rest	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-
4hour at rest	1.80	1.21	1.57	0.63	0.87	0.73	<0.001	0.35	0.03	<0.001
8hour at rest	3.13	0.82	2.07	0.25	1.33	0.80	<0.001	<0.001	<0.001	<0.001
12hour at rest	2.97	0.67	2.73	0.58	2.40	0.67	<0.001	0.14	0.04	0.001
24hour at rest	3.33	0.55	2.73	0.58	2.60	0.67	<0.001	<0.001	0.42	<0.001
48hour at rest	3.23	0.82	2.63	0.56	2.50	0.51	<0.001	0.001	0.35	<0.001

**Table 2: Mean Post-Operative Visual Analogue Score (VAS) during movement**

	B Group		BD Group		BM Group		P Value	P Value between different groups		
	Mean	SD	Mean	SD	Mean	SD		BVs.BD	BDVs.BM	BVs.BM
Immediate after TAP Block during movement	0.00	0.00	0.00	0.00	0.00	0.00	-	-	-	-
4 hour during movement	3.20	1.24	1.93	0.58	1.33	0.96	<0.001	<0.001	0.005	<0.001
8 hour during movement	4.83	0.53	3.37	0.81	2.00	1.11	<0.001	<0.001	<0.001	<0.001
12 hour during movement	4.37	0.85	4.40	1.04	3.90	1.16	<0.001	0.90	0.08	0.07
24 hour during movement	4.63	0.72	4.30	0.79	3.90	0.96	<0.001	0.09	0.08	0.001
48 hour during movement	4.40	0.97	3.93	0.91	3.80	1.10	<0.001	0.05	0.61	0.02

Mean duration of analgesia was 6.40±1.73 hours in Group B, where as in group BD it was 12.53±4.80 hours and in Group BM it was 20.40±10.98 hours. By using ANOVA test p – value <0.001 (highly significant), therefore there significant difference between mean duration of analgesia in group B, BD and BM.

The mean consumption of analgesic was 145.00 ±44.24 mg tramadol in Group B and 81.67±27.80 mg tramadol in Group BD and in group BM it was 66.67±33.04 mg tramadol.

By using ANOVA test p – value <0.001 (highly significant), therefore significant difference between mean analgesic consumption in group B, BD and BM. None of the patients in either group had any adverse effect.

**DISCUSSION**

The TAP block is a simple and effective analgesic technique, appropriate for surgical procedures where parietal pain is a significant component of postopera-

tive pain. It can be performed when neuraxial blocks are contraindicated and it provides an alternative analgesic technique. Over past 5 years, a series of studies have highlighted the value of transversus abdominis plane block after initial description of the technique by Rafi.

The present study was undertaken to compare role of dexmedetomidine and magnesium sulphate as an adjuvant to Bupivacaine in Transversus Abdominis Plane Block (TAPB) in 90 patients scheduled for caesarean section surgery. The patients were randomly allocated in three groups of thirty patients each. All patients were given spinal anaesthesia with Bupivacaine heavy 0.5% (0.3 mg/kg). We found that Transversus Abdominis Plane Block (TAP Block) provides better postoperative analgesia in caesarean section surgery where parietal wall pain forms a major component of pain. Combination of 0.25% bupivacaine and 150mg magnesium sulphate and combination of 0.25% bupivacaine and 0.5mcg/kg dexmedetomidine provides longer duration of postoperative analgesia compared to 0.25% bupivacaine alone.

Baaj JM *et al* (2010)<sup>3</sup> evaluated the efficacy of TAP block for postoperative analgesia in 40 patients undergoing cesarean delivery under spinal anaesthesia with bupivacaine and fentanyl. At the end of surgery, they received bilateral ultrasound-guided TAP block either with bupivacaine 0.25% (B group, n=20), 20 ml on each side, or saline (S group, n=20).

The TAP block with bupivacaine reduced post-op VAS by 25% compared with control group. Total morphine requirement in the first 24 post-op hrs were also reduced in the bupivacaine group compared with the placebo group (25.89 ± 5.13 mg versus 62 ± 4.78, p <0.05) This corresponds with results of our study that post operative analgesic requirement is significantly less which is also corresponds with the results of *Salman LA et al (2012)*<sup>4</sup>, *McDonnell JG et al (2007)*<sup>5</sup>, *NirajG et al (2009)*<sup>6</sup>, *Carney J et al(2008)*<sup>7</sup> The time for the first analgesic dose was longer in Group BD than Group B and the total doses of used morphine were less among Group BD patients in comparison to those in Group B. They concluded that addition of dexmedetomidine to bupivacaine in TAP block achieves better local anaesthesia and provides better pain control post-operatively without any major side-effects which corresponds with our results.

## CONCLUSION

Transversus Abdominis Plane Block (TAP Block) provides better postoperative analgesia in caesarean section surgery where parietal wall pain forms a major component of pain. Combination of 0.25% bupivacaine and 150mg magnesium sulphate and combination of 0.25% bupivacaine and 0.5mcg/kg dexmedetomidine provides longer duration of postoperative analgesia compared to 0.25% bupivacaine alone. Maximum duration of analgesia observed with combination of 0.25% bupivacaine and magnesium

sulphate 150mg. Looking to safety profile, opioid sparing effect, reduced anti-emetic use, longer duration of postoperative analgesia and patient satisfaction, combination of 0.25% bupivacaine and magnesium sulphate 150 mg can be an attractive combination for TAP block. Thus, TAP block when used as a part of multimodal regime provided superior analgesia upto 48 hours and reduced the need of opioid analgesic following LSCS under spinal anaesthesia.

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