Section: Anaesthesia

Original Research Article

COMPARISON OF EFFICACY OF BUPIVACAINE WITH DEXMEDETOMIDINE VERSUS BUPIVACAINE ALONE FOR TRANSVERSUS ABDOMINIS PLANE BLOCK FOR POST OPERATIVE ANALGESIA IN PATIENTS UNDERGOING ELECTIVE CAESAREAN SECTION

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Abstract

Background: Increasing rate of Caesarean sections and inadequate pain relief following Caesarean section is seen in almost all parts of the world. Transversus abdominis plane block is popular as a part of multimodal analgesia for post-operative pain relief following abdominal surgeries. The aim is to compare bupivacaine and bupivacaine with dexmedetomidine in transversus abdominis plane block for pain relief after Caesarean section. **Materials and Methods:** ASA I and II parturient with no comorbidities admitted for elective Caesarean section were included in the study. Thirty-five patients were in each study (with dexmedetomidine) and control (without dexmedetomidine) groups. At the end of Caesarean section done under spinal anaesthesia, transversus abdominis plane block was done bilaterally under usg using in-plane technique of needle insertion. 20 ml of 0.25% bupivacaine with 0.5 mcg/kg of dexmedetomidine in the study group and 20 ml of 0.25% bupivacaine in the control group were injected in the neurovascular plane. **Result:** Eight patients from the study group and 15 from the control group were given opioids as rescue analgesia. The average time at which rescue analgesia was first sought was 14.25 and 7.73 h in the study and control groups, respectively. The P value of this difference was 0.0136 and was found to be statistically significant. **Conclusion:** The addition of dexmedetomidine to bupivacaine in TAP block prolonged the duration of time at which first dose of rescue analgesia was sought and also reduced the total dose of opioid requirement in the first 24-h post- Caesarean section.

INTRODUCTION

Until 2010, Caesarian sections were limited to 8.5% of all deliveries in the country, just under the recommended level of 10–15%, according to the WHO,[1] report. But in the last decade or so, the numbers have escalated in many parts of India—reaching as high as 41% of deliveries in Kerala, and 58% in Tamil Nadu, according to a report by the ICMR School of Public Health.[2]

After a Caesarean delivery, women need effective postoperative pain relief for improved well-being of both mother and newborn.[3] Also, adequate pain relief helps patient to ambulate early and prevent any thrombotic incidents.[4]

In an effort to achieve the target recommended by the RCoA, this study was done to evaluate the efficacy of transversus abdominis plane block with bupivacaine 0.25% versus bupivacaine 0.25% and dexmedetomidine 0.5 mcg/ kg under ultrasound guidance for post-operative pain relief following lower segment caesarean section. Dexmedetomidine, an imidazole compound, is the pharmacologically active dextroisomer of medetomidine that displays specific and selective a2-adrenoceptor agonist activity and causes sedation, analgesia without any delirium, or respiratory depression.[5,6] Its action in the brain and spinal cord inhibit neuronal firing, causing effects like hypotension, bradycardia, and pain relief.

TAP Block

The transversus abdominis plane block was first described in 2001 by Rafi, who performed the traditional landmark technique, through the lumbar triangle of Petit.

In this, the drug that is injected into the neurovascular plane between the internal oblique and transverses abdominis muscle anaesthetizes the nerves of the anterior abdominal wall (T6–T11).

In a recent meta-analysis by Siddiqui blocks reduce post-operative opioid usage, extend analgesia

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duration, and provide effective pain relief while minimizing opioid-related side effects like sedation and nausea/vomiting.[7]

Aim

To study the efficacy of bupivacaine 0.25% with dexmedetomidine and that of bupivacaine 0.25% alone in transversus abdominis plane (TAP) block for post-operative analgesia in patients undergoing elective C-section.

Group 1: bupivacaine 0.25% + Dexmedetomidine 0.5 mcg/kg

Group 2: bupivacaine 0.25%

Prospective Randomized Interventional Single-blind study.

Objective

Primary Outcome

The time for first rescue analgesia after the TAP block.

Secondary Outcome Measures

Total dose of rescue analgesia required in 24 h post-operatively.

MATERIALS AND METHODS

ASA I and II and above 18 years of age, who were admitted for safe confinement.

Exclusion criteria used in the study were patient refusal, allergy to study medications, localized infection over injection point, patients with significant coagulopathies and with contraindications to regional anaesthesia, patients with heart diseases, altered renal or liver functions, psychological disorders, patients with pregnancy-induced hypertension and gestational diabetes.

Sample Size: Sample size (70) was determined prospectively using data from previous studies.[11]

Detailed Description: Institutional ethical committee clearance was obtained.

Written informed consent was obtained from all patients. Routine nil by mouth guidelines were followed.

Patients who satisfied the inclusion criteria were allotted to either group by the sealed envelope technique.

Preoperatively, the patient's blood pressure, heart rate, and oxygen saturation were recorded. All patients were preloaded with 1 liter of crystalloids [Tables 1- 4].

Subarachnoid block with 27G Quincke's spinal needle in the sitting position with bupivacaine heavy 0.5% 10 mg and 20mcg fentanyl was given to achieve block level of T6 for the Caesarean section. The patient's heart rate, NIBP, oxygen saturation was recorded every 5 min during the intraoperative period [Figure 1&2].

At the end of the C-section, the operative wound was covered with a sterile pad. TAP block was performed under strict aseptic precautions after cleaning the site of injection with antiseptic solution. Bilateral TAP block was performed under Usg with GE logiq e machine using high-frequency probe and in-plane technique of needle insertion. 25G spinal needle with 10-cm extension tube was used to inject the drug. Saline was injected under ultrasound guidance to confirm the correct placement of the needle in the neurovascular plane.

Study Group (with Dexmedetomidine):

Dexmedetomidine 0.5 micrograms/kg (Dexem) with 0.25% bupivacaine (Sensorcaine) to a total volume of 40 ml (20 ml each side) was used for the TAP block.

Control Group (without Dexmedetomidine):

0.25% bupivacaine 40 ml (20 ml each side).

At the completion of the TAP block, sterile dressing was applied to the operative wound and patient blood pressure, heart rate and VAS were recorded. Average duration of the surgery was between 1 and 1.5 h.

None of the patients had any complication intraoperatively.

Patients received 1g paracetamol intravenous immediately in the recovery room and every 8 h thereafter. Rescue analgesia was provided with 50 mg of intravenous tramadol and additional doses of 50 mg every 6 h thereafter till VAS was less than 3 or was precluded by adverse effects such as nausea and/or vomiting, respiratory depression (Sp O2 \92%, ventilatory frequency rate \10), or occurrence of deep sedation.

In the first 24 h post-operatively, mean arterial pressure, heart rate, VAS (at rest and on coughing), sedation score (RS), nausea and vomiting score were recorded on admission to recovery and at 1,2,4, 8, 12, 18, and 24 h post-operatively by a post-operative care nurse who was unaware of the group to which the patient belonged.

The time following the TAP block when rescue analgesia was first sought, total dose of tramadol required in the first 24 h post-operatively, and its adverse effects like pruritus, nausea and vomiting were recorded. Visual analogue scale (Where 0 = no pain and 10 = worst imaginable pain) was used to assess post-operative pain during rest and on coughing.

Nausea and vomiting were recorded on a 4-point scale (0 = none, 1 = nausea, 2 = retching, 3 = vomiting). IV ondansetron 4 mg was offered for any patient with a score C1. A sedation score on a 6-point scale was used.

Statistical Analysis: The sample size was calculated from data based on the previous similar studies.[11]

Thirty-five patients received TAP block with 0.25% bupivacaine only (control), and 35 patients received TAP block with 0.25% bupivacaine and 0.5 mcg/kg dexmedetomidine (study). The results were analyzed using the PrismPad Graph software version 7.02.

The primary outcome was to calculate the time at which the first dose of opioid was required. Total dose of opioid used was calculated as the secondary outcome.

P value of \0.05 was considered as statistically significant.

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RESULTS

The groups were comparable based on demographic data.

Thirty-five patients were included in each study and control group.

Only 8 patients from the study group and 15 patients from the control group required any opioids. The average time at which the first dose of opioid was requested was

14.25 h in the study group and 7.73 h in the control group. The P value of this difference was found to be 0.0136.

The mean and median pain scores were calculated, and the P value was recorded. The difference between the pain scores of the two groups was found to be statistically significant.

The median pain score of the two groups was compared using the Mood's median test. The Chi-square statistic is 3.9683. The P value is 0.046366. The result is significant at a P value \0.05.

The mean dose of tramadol required was 11.43 mg in the study group and 32.86 mg in the control group over the first 24 h, and the P value was found to be \0.001. This difference is statistically significant.

The patients who received dexmedetomidine had a sedation score of 3 versus the control group who had a score of 2.

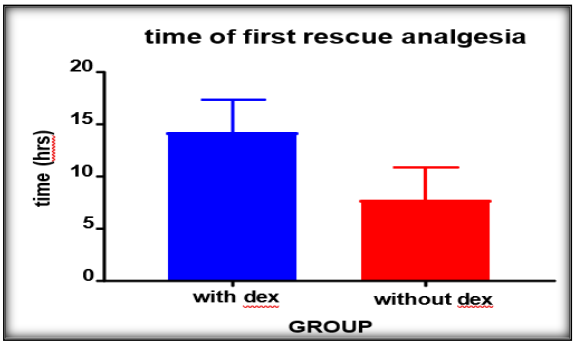

Figure 1 Time of first rescue analgesia

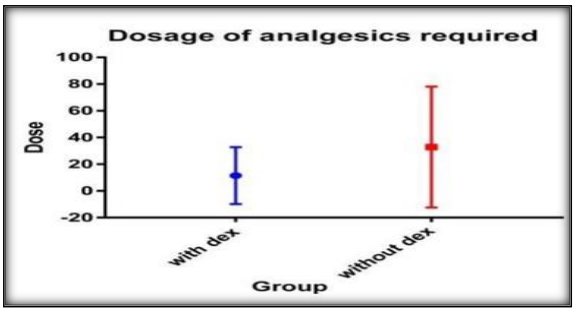

Figure 2: Dosage of analgesics required

Table 1: Sedation score

Level of activity	Modified Ramsay score
Anxious, agitated, restless	1
Cooperative, oriented, tranquil	2
Responsive to commands only	3
Brisk response to light glabellar tap or loud auditory stimulus	4
Sluggish response to light glabellar tap or loud auditory stimulus	5
No response to light glabellar tap or loud auditory stimulus	6

Table 2: Results: Demographic data

	Study (with dexmedetomidine)	Control (without dexmedetomidine)	P value
BMI	26.79	27.38	0.3051
Age	30.69	29.77	0.1292

Table 3: VAS score of both groups

Time in hours	With dexmedetomidine	Without dexmedetomidine	P value of mean	With dexmedetomidine	Without dexmedetomidine
4 m	2.2	2.3	0.8052	2	2
8	2.543	1.5	0.0025	3	1
8M	3.31	2.25	0.007	4	2
12	2.17	2.771	0.15	1	3
12M	3.02	3.77	0.09	2	4
18	1.8	2.97	0.002	1	3
18M	2.45	3.97	0.0006	2	4
24	1.17	3.02	0.0001	0	3
24M	1.6	4.0	0.0001	0	4

Table 4: P value of median VAS score

	Group 2	Group 1	P value
Above median	7	2	0.046366
Equal to or below median	8	13	

DISCUSSION

Ultrasound guidance has further refined the technique and increased the success rate. Several studies done by Lee et al,[12] and Onishi et al,[13] have concluded that TAP block is superior to or comparable to neuraxial opioids for the control of post-operative pain following Caesarean sections. This reduces the need for opioids and hence their side effects in the post-operative period. Mishriky et al,[14]

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have done a meta-analysis of RCTs on TAP block for pain relief after Caesarean section and concluded that TAP block produces pain relief comparable to intrathecal morphine without the side effects of morphine. Meta-analysis done by Nanze Yu et al,[15] has proved the superiority of TAP block over local wound infiltration for pain relief following lower abdominal surgeries. This supports Jankovic's,[16] idea of calling TAP block, the holy grail of anaesthesia for lower abdomen.

Almarakhi et al,[11] study has proved that the addition of dexmedetomidine to local anaesthetic in TAP block provided better pain relief than local anaesthetic alone following abdominal hysterectomies.

In a study by Toshniwal et al,[18] the use of ultrasound to perform the TAP block has increased the success rate even in obese patients.

Tan et al,[19] performed TAP block under ultrasound guidance after Caesarean section and concluded that TAP block not only reduced the morphine consumption but also improved patient satisfaction.

A meta-analysis by Abdallah,[23] compared the posterior versus the lateral approach of performing the TAP block and concluded that the posterior approach may be superior to the lateral approach. The use of ultrasound has overcome this, as the injection and spread of the drug in the neurovascular plane can be clearly visualized.

Also, the use of ultrasound decreases the dose of local anaesthetic used in various peripheral nerve blocks due to the injection of the drug in close proximity to the nerves.[29]

TAP block in Caesarean section effectively manages postoperative pain. The addition of dexmedetomidine to the local anesthetic reduces the need for opioids and significantly delays the time for the first opioid dose.

Two patients in the study group had bradycardia (in the recovery room within 15 min of TAP block administration and were given Inj. Atropine 0.6 mg. However, they were hemodynamically stable. No other side effects were noted. Newborns were monitored for the first 24 h after birth for any respiratory depression and bradycardia.

The limitation of this study is plasma levels of dexmedetomidine were not monitored. Also, the time at which the TAP block began to work and the time at which the sensory effect of the intrathecal block began to wear off could not be clearly differentiated.

CONCLUSION

The addition of dexmedetomidine to bupivacaine in TAP block prolonged the duration of time at which first dose of rescue analgesia was sought and also reduced the total dose of opioid requirement in the first 24-h post-Caesarean section.

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