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Comparison of Intrathecal Tramadol with Bupivacaine and Bupivacaine alone to Control Shivering in Patients Undergoing Caesarean Surgery

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Abstract

Context: It's important to prevent shivering in parturient undergoing caesarean surgery under spinal anaesthesia as shivering results in increased metabolic rate, CO2 and oxygen consumption. *Aims:* Intrathecal tramadol as an adjuvant to bupivacaine, to assess incidence and grading of post spinal shivering, onset and duration of sensory and motor block, haemodynamic changes and APGAR score of the new born. *Material and methods:* Thirty patients aged 21-35 years of ASA I & II posted for elective or emergency caesarean section were randomly allocated into two groups. Group B (n=15) received inj. bupivacaine 0.5% heavy 2 ml+0.2 ml 0.9% normal saline and group T (n=15) received inj. bupivacaine 0.5% heavy 2 ml+inj. tramadol 0.2 ml (10 mg) preservative free intrathecally. *Statistical analysis:* The statistical analysis was assessed by unpaired students t-test and Chi square test. *Results:* Intra-operatively, shivering in 66.67% compared to 13.3% and post-operatively in 80% compared to 6.67% was seen, in group B & group T respectively. Onset of sensory blockade was 8.33 ± 0.90 minutes versus 9.20±0.68 minutes and motor blockade was 11.13 ± 0.834 minutes versus 12.00 ± 0.756 minutes, in group T and group B respectively whereas, duration of sensory and motor blockade were prolonged in group T ($p<0.05$). No differences in APGAR score, hemodynamic parameters and incidence of complication between both groups. *Conclusion:* Intrathecal tramadol significantly reduces the incidence of shivering in parturient undergoing caesarean surgery without significant adverse effect on mother and neonates while having early onset of both motor and sensory components in subarachnoid block.

Keywords: Shivering; Spinal anaesthesia; caesarean; Intrathecal tramadol.

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Introduction

Shivering is the commonest feature associated with spinal anaesthesia and reported incidences vary from 40% to 70% [1]. Post anaesthesia shivering can be defined as spontaneous, involuntary, rhythmic, oscillating, tremor-like muscle hyperactivity after general anaesthesia or regional anaesthesia. It can cause arterial hypoxemia, lactic acidosis and interference in monitoring of haemodynamic and pulse oxymetry. Obstetric patients are already having low pulmonary reserve due to decrease in functional residual capacity and have already high metabolic rate leading them more vulnerable to hypoxemia. Intravenous tramadol has been used by many for the prevention of post spinal shivering [2].

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Materials and Methods

Thirty patients aged 21-35 years of American Society of Anaesthesiologists (ASA) grade ASA I and II posted for lower segment caesarean section (LSCS) (elective or emergency) under spinal anaesthesia were included in the present study after obtaining approval from the ethics committee and written informed consent. This study was conducted at Dhiraj hospital, S.B.K.S. M.I. & R.C., Sumandeep Vidyapeeth Deemed University, Piparia, Vadodara, Gujarat. Group B (n=15) received inj. bupivacaine 0.5% heavy 2 ml + 0.2 ml 0.9% normal saline and Group T (n=15) received inj. bupivacaine 0.5% heavy 2 ml + inj. tramadol 0.2 ml (10 mg) preservative free intrathecally. A statistical analysis was done using the Chi square test and student-t test.

Inclusion criteria

- Parturient posted for elective and emergency LSCS age <21 & >35.
- ASA grade I and II.
- Patient willing to sign informed consent.

Exclusion criteria

- Patient's refusal.
- Patient with ASA III or IV.
- Acute emergency indications for LSCS such as severe foetal distress or meconium stained amniotic fluid.
- Patient in whom GA was required afterwards.
- Short statured patients with a height below 145 cm.
- Patients with severe preeclampsia and eclampsia, cardio-respiratory, neurological or psychiatric illness.
- Patients with coagulopathy.
- Patients with spine deformity.
- Patients with local skin infections at the site of injection.
- Patients having history of allergy to any opioid or local anaesthetic drug.

Detailed pre-anaesthetic check-up of patients posted for elective LSCS was done a day prior to surgery. All routine investigations were done. All elective patients were kept nil per orally for minimum 6 hours prior to surgery. Written and informed consent was taken. Heart rate (HR), blood pressure (BP), pulse oxymetry (SpO_2) and electrocardiogram (ECG) were recorded. Intravenous line was secured; preloading with 8 ml kg^{-1} per hour of inj. Ringer's lactate was done intravenously [3]. Patients received aspiration prophylaxis medication in form of inj. ranitidine 50 mg i.v. and inj. metoclopramide 10 mg i.v. before being brought to the operation theater. The patients were kept in the left lateral position. Patients were randomly allocated into two groups by slip in box technique.

All patients were premedicated with inj. glycopyrrolate 0.2 mg i.v. and inj. ondansetron 4 mg i.v.

The spinal anaesthesia technique

Under all aseptic and antiseptic precautions lumbar puncture at L_3- L_4 interspaces using a 25G spinal needle with patient in left lateral position was performed.

The study drug was injected into the subarachnoid space over 10-15 seconds slowly after noting the clear free flow of cerebrospinal fluid (CSF) with the operating table kept level. Patients were turned supine immediately and wedge was placed under right hip. Oxygen was given to all patients through mask.

HR, BP, SpO2, temperature were monitored throughout the surgery and recorded at 2, 4, 8, 10, 20, 30, 45, 60, 90, 120, 150, 180 minutes post spinal. Sensory block was assessed by pin-prick 4 test using 3-point scale. Duration of sensory block was counted from onset to the time of two-segment regression. Motor blockade was assessed using Bromage 4 three point score. On achieving T6 sensory level and Bromage scale 3, surgeon was asked to start the surgery. Grading of shivering was done as per Wrench 5. APGAR 6 score of baby was recorded at 1and 5 minutes after birth. Any complication was noted. If patient's H.R. <60, it was considered as bradycardia and was treated with inj. atropine 0.6 mg i.v. Reduction in BP < 30% from baseline value was treated with i.v. fluids and inj. ephedrine 6 mg i.v. After delivery of the baby, 10 units of inj. oxytocin i.v. were given through infusion. If patient developed shivering, first on-pharmacological methods such as covering with blankets was used, if it did not work then pharmacological measure such as inj.

Results

Total 30 patients were allocated for the study. Both groups were comparable in respect to age and ASA.

Table 1: Age and ASA Grading of Patients

Variables	Group B (n=15)	Group T (n=15)	p value	Significance NS-Not significant S- Significant
Age (years) Mean ± SD	23.46 ±2.92	23.47 ± 3.31	0.546	NS
ASA I (%)	53.33% (8)	60.00% (9)	0.713	NS
ASA II (%)	46.6% (7)	40.00% (6)	0.713	NS

Table 2: Onset & Duration of Sensory and Motor Block

Time (minutes)	Group B (n=15) Mean±SD	Group T (n=15) Mean±SD	p value	Significance
Onset of sensory block	9.20 ± 0.67	8.33 ± 0.9	<0.006	S
Onset of motor block	12.00 ± 0.75	11.13 ± 0.83		
Duration of sensory block	81.5 ±11.17	120.8 ± 8.71		
Duration of motor block	104.1 ± 10.9	133.5 ± 11.0		

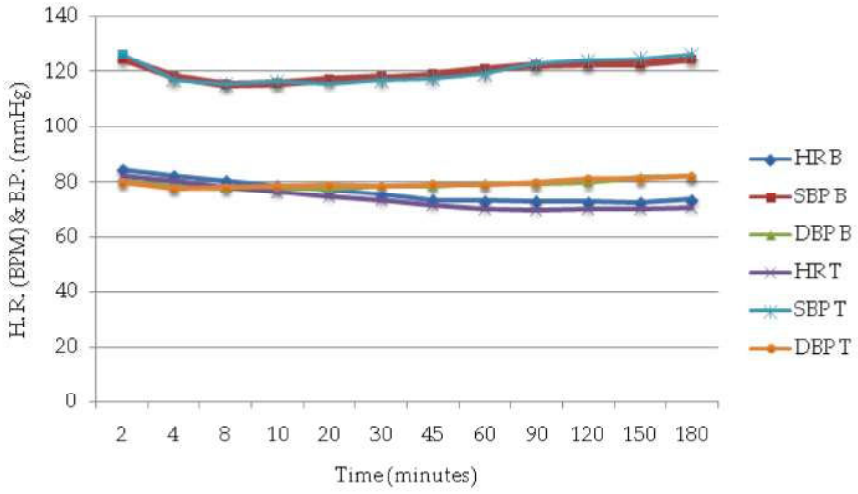

Chart 1: Changes in H.R. and Blood Pressure in both Groups

Table 3: Intra-Operative & Post-Operative Shivering

Shivering	Number of patients Group B (n=15)		Group T (n=15)		p value	Significance
Shivering	Intra operative 10 (66.66%)	Post operative 4 (26.66%)	Intra operative 2 (13.33%)	Post operative 1 (6.67%)	<0.001	S
Total	14		3			

Table 4: Wrench Grading of Shivering

Grade of shivering	Group B	Group T	p- value Significance
0 (No shivering)	1	12	0.001 (S)
1	7	2	
2	5	1	
3	2	0	
4	0	0	
Total	15	15	

Table 5: APGAR score in both the groups

Time	APGAR Score	
	Group B	Group T
1 min	7	7
5 min	9	9

Table 6: Post-Operative Complications

Complications	Group B n%	Group T n%
Nausea	1 (6.67%)	2 (13.33%)
Vomiting	1 (6.67%)	1 (6.67%)
Pruritus	NIL	NIL
Bradycardia	NIL	NIL
Sedation	NIL	NIL
Respiratory Depression	NIL	NIL

Discussion

The present study was conducted at Dhiraj hospital in thirty patients aged 21-35 yrs of ASA grade I or II with the aim to evaluate efficacy of intra-thecal tramadol for prevention of shivering under spinal anaesthesia in the patients scheduled for LSCS.

Group T showed a statistically significant onset in the sensory block (8.33 ± 0.90 minutes) as compared to group B (9.20 ± 0.68 minutes). Also, Group T showed a statistically significant onset in motor block that was 11.13 ± 0.834 minutes versus 12.00 ± 0.756 minutes in group B, which was similar to the study done by Subedi et al. [7]. Group T showed significant prolongation of duration of sensory block and motor block as compared to group B, which was similar to the study done by Fahad zahid et al. (Table 2).

Mean heart rates, systolic blood pressure and diastolic blood pressure showed no difference in both the groups (Chart 1).

The result of our study evaluated that there is a significant decrease in the incidences of shivering in group T both intra-operatively (13.33%) as compared to group B (66.67%) and postoperatively group T (6.67%) in comparison to group B (26.66%), with increased incidences of grade 2 and 3 shivering in group B. This study corresponds with the study carried out by Subedi et al. [7] (Tables 3,4).

Our study showed no adverse effects of tramadol on the neonatal APGAR score taken at 1minute and 5 minutes after delivery in both the groups (Table 5). This goes in accordance with the views expressed by Claahsen et al. [8] in the pharmacokinetic study in parturient receiving tramadol for labour analgesia, as the neonates possess adequate capacity to metabolize tramadol.

In our study, incidences of nausea in group T was 13.33% versus 6.67% in Group B whereas, incidence of vomiting was same for both the groups (6.67%) (Table 6) In the study of Subedi et al. [7] nausea was present in 26% of patients and vomiting was present in 18% of the patients intra-operatively, whereas in the study done by Verma et al. [9] nausea was seen in 10% and 6.6% patients experienced vomiting. The increase incidences of nausea and vomiting might be probably due to additional effect of using uterotonic agents used during LSCS. Lussos et. al. [10] suggested that surgical manipulation of uterus, abdominal wall and peritoneum lead to development of nausea and vomiting even after the delivery, even in the presence of adequate sensory and motor blockade.

Conclusion

From the present study, we could conclude that tramadol 10 mg along with 2 ml of 0.5% heavy bupivacaine if given intrathecally to the patients who are scheduled for LSCS plays a significant role in prevention of the incidence of anaesthesia induced shivering with early onset of both sensory and motor components of the subarachnoid block.

The incidence of nausea and vomiting is higher in those receiving intrathecal tramadol with no major differences in hemodynamic parameters both intraoperatively and postoperatively when compared with placebo (intra-thecal normal saline).

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Conflict of Interest: None

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