EFFICACY OF INTRATHECAL FENTANYL FOR PREVENTION OF SHIVERING IN LOWER SEGMENT CAESAREAN SECTION UNDER SPINAL ANAESTHESIA

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ABSTRACT

Objective: To determine the efficacy of intrathecal fentanyl in prevention of shivering in lower segment caesarean section under spinal anaesthesia.

Study Design: Quasi experimental study.

Place and Duration of Study: It was conducted in Anesthesiology department, Pak Emirates Military Hospital, Rawalpindi, from Feb 2018 to Mar 2018.

Methodology: A total of 60 patients were included in the study, and divided in two groups of 30 each. They were preloaded with Ringer's lactate solution (10ml/kg). Fentanyl group (group F) was given 2.5 ml of 0.5% Bupivacine and 25µg (0.5 ml) of fentanyl, whereas group S received 0.5 ml of normal saline along with 2.5 ml of 0.5% bupivacaine. Shivering was observed in both groups for 2 hours.

Results: There was no statistically significant difference between the two groups in regards to average age, weight, height, body mass index, oral temperature. Shivering was observed in 5 patients in group A, and 16 patients in group B. Difference between groups was statistically significant (p=0.003).

Conclusion: Intrathecal fentanyl is effective in prevention of shivering in decreasing frequency of shivering in patients undergoing lower segment caesarean section under spinal anaesthesia.

Keywords: Fentanyl, Intrathecal, Shivering, Spinal anaesthesia.

INTRODUCTION

Spinal anaesthesia is the preferred anesthetic technique for LSCS due to its better safety profile. However it is associated with side effects like hypotension, bradycardia, nausea and vomiting. Shivering is also associated with spinal anaesthesia, having incidence upto 55%[1,2]. It inc-reases oxygen consumption, carbon dioxide production and cardiac workload. Different pharmacological interventions are used to treat shivering like pethidine, tramadol, ketamine and dexmedetomidine. However, these interventions are used once shivering has started and patient has faced the agony[3,4]. Also, all these are associated with different complications/side effects.

Prevention has always been preferred over cure. Different drugs have been used for prevention of shivering, e.g, intrathecal dexmedetomidine[11], (not currently available in Pakistan), intrathecal meperidine (with concerns of nausea and vomiting, safety of intrathecal administration in formulation available in Pakistan) etc.

Fentanyl is a synthetic opioid analgesic with potency more than morphine. It can be given by different routes. Intrathecal fentanyl has been studied for its role of prevention of shivering; however, its efficacy has not been tested in Pakistan. Intravenous fentanyl has been studied in Pakistan for its efficacy in treatment though[7,10].

This study was to compare fentanyl 25 microgram with placebo for prevention of shivering secondary to spinal anesthesia for elective cesarean delivery.

METHODOLOGY

The protocol was approved by the ethical committee of Pak Emirates Military Hospital Rawalpindi. Informed consent was obtained from

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60 healthy women selected for the study, and were divided in two groups, F (Fentanyl) & S (Saline) group, each having 30 patients. Non-probability consecutive sampling was used for the selection of sample. No significant statistical difference was observed between age, height, weight and BMI between groups (table-I), scheduled for elective term cesarean section under spinal anesthesia. Parturients with contraindication to spinal anesthesia, allergy to the local anesthetics or fentanyl, metoclopramide, phenylephrine and pethidine were excluded. Subjects were randomly divided into two equal groups by balloting (30 patients in each group) by lottery method. In order to facilitate blinding, test solutions were prepared by an anesthetic nurse who was not involved in the study. Neither the anesthesiologist nor the parturient herself was aware of the drugs and a blinded investigator evaluated for presence and severity of shivering. The ambient temperature of operating room was maintained at 24°C. A 18 Guage intravenous catheter into a forearm vein was inserted and Ringer'slactate 10 ml/kg was administered. Monitoring included oral temperature, pulseoximetry, non-invasive arterial pressure and ECG. Spinal anesthesia was performed at L 3-4 interspace with 25 G Quincke needle in the sitting position. The patients received 12.5 mg (2.5ml) of 0.5% hyperbaric bupivacaine combined with 25 µg (0.5ml) fentanyl in group F as a study group and 12.5 mg (2.5ml) of 0.5% hyperbaric bupivacaine combined with 0.5 ml normal saline in group S as a control group, respectively. All fluids were kept at room temperature for 24 hours before used. On completion of spinal injection the patient was placed in the supine position with left uterine displacement. Sensory analgesia was evaluated by pinprick before the start of surgery and rechecked for at least 15 min after spinal anesthesia. Continuous pulse oximetry and arterial blood pressure was recorded every minute until delivery and then every 5 minute until the end of surgery. Pain was checked objectively at the time of patient complain by Visual Analogue Scale (VAS, 0= no pain and 10= the worst imaginable pain). Shivering by a 4-point rating score (0= None, 1=Mild fasciculation in face or neck, 2=Visible tremor in more than one muscle group, 3 (Shivering involving whole body) was checked every 5 minutes during surgery and at recovery for two hours. Presence of any grade of shivering was labeled as "Shivering Present". Episodes of perioperative side effects such as hypotension (SBP <30% from baseline or <80 mmHg) bradycardia (HR <60 bpm), oxygen desaturation (SpO2 <90%), respiratory depression (RR <12 bpm) and hypothermia (temperature <35°C) and itching were recorded. Hypotension was treated with bolus of fluid and incremented dose of phenylephrine 50µg IV and bradycardia was treated with atropine 0.5 mg IV. Pain with VAS ≥4 was treated with incremented dose of nalbuphine 5 mg IV and shivering with score ≥2 was treated with pethidine 30 mg IV. Intravenous metoclopramide 10 mg was used to treat nausea and vomiting. Presence of hypotension, bradycardia, nausea and vomiting in patients was labeled as "Present" for statistical analysis.

Sample size was calculated using WHO calculator, using parameters. Level of significance = 5%, Power of test=90%. Anticipated population proportion 1=10%. Anticipated population proportion 2=75%. Sample size in each group=30. Total sample size=60.

IBM SPSS version 23 was used for statistical analysis. Mean and standard deviation were calculated for age, height, weight, BMI and oral temperature. Independent Sample's t-test was used to compare these parameters. Frequency and percentages were calculated for hypotension, nausea and vomiting, bradycardia and shivering. Chi Square/Fisher's exact test was used to compare these parameters. *p*-value ≤0.05 was taken as significant.

RESULTS

Sixty patients were selected for the study, and were divided in two groups, each having 30 patients. No significant statistical difference was observed between age, height, weight and BMI between groups (table-I). There was no

significant statistical difference between oral temperatures in two groups preoperatively (table-II). There was no statistically significant difference between the two groups in regards to hypotension, bradycardia, nausea and vomiting

Table-I: Comparison of Age, Height, Weight and BMI between two Groups.

	Group F (Fentanyl)	Group S (Normal Saline)	*p*-value
Age (years)	30.87 ± 5.95	28.80 ± 4.85	0.15
Height (cm)	161.97 ± 8.16	164.3 ± 6.99	0.24
Weight (kg)	66.83 ± 8.67	68.73 ± 8.04	0.38
BMI	25.57 ± 3.49	25.54 ± 3.11	0.97

Table-II: Comparison of oral temperatures between two Groups.

Group F	Group S	*p*-value
37.045 ± 0.179	37.042 ± 0.143	0.250

Table-III: Comparison of Bradycardia, Hypotension, Nausea and vomiting Between two Groups.

	Group F (Fentanyl)	Group S (Normal Saline)	*p*-value
Bradycardia	4	5	0.999
Hypotension	16	14	0.603
Nausea & Vomiting	10	7	0.390

Table-IV: Comparison of Frequency of Shivering between two Groups.

Shivering	Group-A (Fentanyl)		Group-B (Saline)	
	No.	%	No.	%
Present	5	16.7	16	53.33
Absent	25	83.3	14	46.67
***p*-value**	0.003			

(table-III). Shivering was present in 05 patients (16.7%) in group F, and in 16 patients (53.33%) in group S. This difference between the two groups is statistically significant (p=0.003) (table-IV).

DISCUSSION

Incidence of shivering is quite high in spinal anaesthesia 6, leading to increase in oxygen consumption, carbon dioxide production and stress on myocardium[10-14]. Different mechanisms have been suggested for shivering associated with spinal anaesthesia, including inhibition of tonic vasoconstriction and redistribution of core heat below the level of block to peripheral tissues[15].

Different drugs have been used for sake of treatment, however, the stress associated with shivering demands prevention in the first place, to avoid patient agony.

Many drugs have been tested for intrathecal administration abroad, however, these are either not available in Pakistan at the moment like dexmedetomidine, or these are associated with complications and safety issues with intrathecal administration like meperidine.

Fentanyl is a synthetic opioid with more analgesic potency than morphine. Intrathecal administration of fentanyl along with bupivacaine improves the onset of action and duration of anaesthesia without increasing side effects[16]. Its intrathecal administration has also been studied for prevention of shivering; however, studies conducted for prevention of shivering in Pakistani population are very rare. So this study was performed in our set up. 60 patients were selected and divided in two groups of 30 each. Frequency of shivering was significantly less in fentanyl group (20%) as compared to saline group (55%). Also, there was no statistically significant difference between the two groups in regards to bradycardia, hypotension, nausea and vomiting.

Our result is similar to the results presented by Sadegh A and colleagues[17]. They performed their study on 80 patients, and found that frequency of shivering was significantly less in fentanyl group. They used same dose of 25 µg fentanyl added to 12.5 mg of bupivacaine 0.5%.

Techanviate and colleagues[18] also reached the same conclusion that addition of fentanyl reduces shivering without increasing side effects. However, they used 20 µg fentanyl added to 2.2 ml of bupivacaine 0.5% and 0.2 ml of 0.2 mg morphine.

Chow *et al*[19] demonstrated that addition of even 1.25 µg fentanyl reduces the incidence of shivering in TURP.

Though Safavi and his colleagues[20] demonstrated that there is no significant difference between intrathecal fentanyl and intrathecal meperidine for reducing shivering, but their study used 20 µg fentanyl added to 3 ml of bupivacaine 0.5%, unlike our study which used 25 µg fentanyl added to 2.5 ml of bupivacaine 0.5%.

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CONCLUSION

From this we conclude that intrathecal administration of fentanyl is very useful to reduce the frequency of shivering, without increasing side effects.

CONFLICT OF INTEREST

This study has no conflict of interest to be declared by any author.

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