

Evaluation of Efficacy of Tramadol and Pethidine for Control of Perioperative Shivering in Patients Undergoing Elective Surgery under Spinal Anaesthesia

Dr. Koti Naveen¹, Dr Manohar Mane Vilas²

¹Junior Resident III, Bharati Vidyapeeth (Deemedtobe University) Medical College and Hospital, Sangli, India
Email: [nawin27\[at\]gmail.com](mailto:nawin27[at]gmail.com)

²Professor, Department of Anaesthesiology, Bharati Vidyapeeth (Deemedtobe University) Medical College and Hospital Sangli
(Corresponding Author)

Abstract: Evaluation of efficacy of tramadol and pethidine for control of perioperative shivering in patients undergoing elective surgery under spinal anaesthesia. Perioperative shivering had decremental effects which leads to change in vitals and increase in oxygen consumption, catecholamine secretion, CO₂ production. In this study we have used drugs Tramadol and pethidine (0.5mg/kg) for control of peri operative shivering, our main aim was to evaluate the efficacy of tramadol and pethidine for control of perioperative shivering in patients undergoing elective surgery under spinal anaesthesia. Written and informed consent obtained and ASA I and II undergoing surgery under spinal anaesthesia were selected. During perioperative if patients develop shivering either inj. tramadol 0.5mg/kg (group T) or inj. Pethidine 0.5mg/kg (group P) was administered. Both the drugs were evaluated for the efficacy to control shivering and side effects. In group T, 13 patients of 15 showed control of shivering while in group P 11 patients showed control of shivering ($p < 0.05$). Incidence of nausea is more in tramadol group than pethidine group (8 patients to 5 patients). Tramadol is more effective than pethidine for controlling of perioperative shivering.

Keywords: Tramadol, Pethidine, Peri operative shivering

1. Introduction

Shivering is defined as spontaneous, rhythmic, oscillatory, tremor-like muscular activity which occurs as a physiological response to core hypothermia in an attempt to raise the metabolic heat production^(1, 2). In case of spinal anaesthesia Shivering is supposed to be due to heat loss because of venodilation, the incidence of shivering is about 36 to 85% under spinal anaesthesia⁽¹⁾. The common sites to measure body temperature are the mouth, armpit, the ear, and the rectum. Temperature can also be measured on forehead. Shivering occurs mainly in hypothermic (<37°C) patients but may also occur in normothermic (37°C).

Shivering has detrimental effects in the form of interference in monitoring of pulse rate, blood pressure (BP), and ECG, increase in oxygen consumption maybe upto 400-500 times the normal, catecholamine secretion, carbon dioxide production⁽¹⁾.

Increase in heart rate, cardiac output and BP may cause problem in patient with low cardiac pulmonary reserve. Shivering also contribute to increased wound pain, delayed healing which is due to low oxygen tension and poor perfusion which can slow down the deposition of collagen in tissue undergoing repair, both of which can be influenced by pain and restricted breathing due to pain can lead to low-grade hypoxia, and severe pain can cause vasoconstriction, both of which ultimately impair wound healing. Delayed discharge from post-anaesthetic care unit. The present study is designed to compare the efficacy of pethidine and

tramadol on reducing postoperative shivering following sub-arachnoid block and to compare their adverse effects.

2. Materials and Methods

2.1 Study Design

This is an observational study which was approved by institutional ethics committee of BV (DU) Medical College and Hospital, Sangli. The study took place between May 2, 2021 and Oct 2, 2021 at BV (DU) Medical College and Hospital, Sangli. All participants included in the study provided written informed consent.

2.2 Study Subjects

The patients posted for surgeries (lower abdominal, urogenital, orthopedic and gynaecological) under spinal anaesthesia as per inclusion criteria and receiving Tramadol or pethidine as decided by consultant.

Inclusion Criteria

Patients who had shivering in peri operative period age group between 18 to 60 years

Exclusion Criteria

Patients not willing to give consent

2.3 Sample Size and Sampling Technique

- All patient fulfilling Inclusion criteria during study period (Total 30 patients)

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- Study subjects were grouped by the decision of the consultant.
- Sample size was estimated by using appropriate test.

2.4 Study Tools

Digital Monitors in OT and post anaesthesia room for measuring noninvasive BP, HR, oxygen saturation, ECG, RR.

Scales-5point scale, Crossley and Mahajan grading and Inova sedation scale charts for data collection.

2.5 Method

Written and informed consent was taken from the patients undergoing lower abdominal studies under spinal anaesthesia. After applying standard monitors like pulse oximeter, noninvasive blood pressure, 5-lead electrocardiogram and heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), SpO₂, was recorded, Ringer lactate/ NS (temperature of fluid maintained at normal room temperature) was loaded with 10 ml/kg. The ambient temperature of the operation theatre was maintained around 20 to 22^o C and humidity at 70% and constant humidity was maintained.

Spinal anaesthesia given according to standard protocol. All patients were covered with surgical except the area to be operated during the operation.

All cases were screened for shivering, if any, they were graded with a five point scale validated by Crossley and Mahajan (3).

0) No shivering

1 = Piloerection or peripheral vasoconstriction but no visible shivering.

2 = Muscular activity in only one muscle group.

3 = Muscular activity in more than one muscle group but not generalised.

4 = Shivering all over the body.

The patient who developed shivering of grade 1 or more were included in the study. The time at which the shivering started after spinal anaesthesia were recorded (onset of shivering) the severity of shivering were noted according to the crossley and Mahajan scale if there is shivering of 1 or more than 1, the patient received the study drug in the form of tramadol 0.5 mg/kg iv or pethidine 0.5 mg/kg iv based on the decision by the consultant. The time to disappearing the shivering and/or the grade of shivering were noted after 15 min after giving the study drug, if the shivering did not subside by 15 min second dose of the same study drug was given with same dose and again the response was noted after 15 min if the shivering did not subside after 2 doses the treatment was considered as not effective.

Side effects like nausea and vomiting, bradycardia (HR < 60/min), hypotension (>20% of baseline of Systolic blood pressure), and sedation score was recorded.

The sedation score was assessed by Inova sedation scale ⁽⁴⁾:

- 1) Awake and alert
- 2) Drowsy
- 3) dozing intermittently
- 4) Asleep but arousable
- 5) Asleep but not arousable
- 6) unresponsive

The patient were monitored in recovery room every 15 min for hemodynamics respiratory rate, nausea and vomiting and sedation till the effect of spinal anaesthesia will wear off (the sensory level of spinal anaesthesia is decreased by 2 dermatome levels). After the study the efficacy was compared during analysis.

3. Statistical Analysis:

All the data was collected and tabulated and with the help of statistician analysis was done. Data showing normal distribution were presented as mean (standard deviation [SD]), and data showing a non normal distribution were presented as median (interquartile range [range]). P values < .05 were considered statistically significant. Thirty patients were studied, 15 in each Group and the demographic data are summarised in [Table/Fig.1].

1) Demographic Data

	Tramaol (n=15)	Pethidine (n=15)	p value	Inference
Age (Yrs)	33± 9.65	34.55± 8.98	0.6	Non-Significant
Sex (M: F)	13: 7	14: 6	1	Non-Significant
Weight (kg)	52.35±6.12	51.65 ± 5.12	0.7	Non-Significant
ASA PS (I: II)	14: 6	13: 7	1	Non-Significant
Shivering Grade	2.75±0.444	2.5±0.513	0.1908	Non-Significant

There was no significant difference found in shivering grades at the start of study between the two groups.

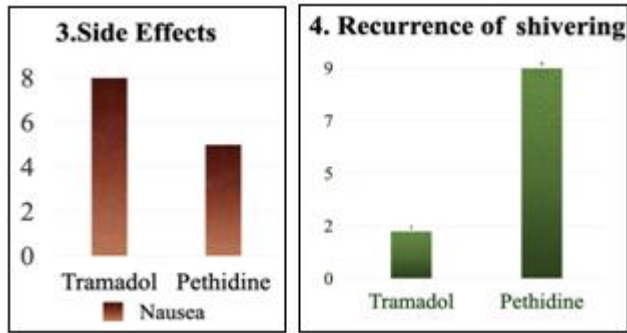
The time interval between administration of drug after onset of shivering was same in both groups and disappearance of shivering was significantly shorter in the Tramadol group [Table/Fig-2].

13 patients in Group T had control of shivering at end of 5 min as compared to Group P there were 11 patients who had control of shivering (p < 0.05) which is statistically significant [Table/Fig-2].

2) Onset of disappearance of Shivering

Time (Minutes)	Tramaol (n=15)	Pethidine (n=15)	p	Inference
2	10	0	<0.0001	Significant
5	13	11	<0.05	Significant
15	15	15	1	Non-Significant

Shivering disappeared in all the patients of group T and P (Total 30 Pts) by 15 minutes. Complications like nausea occurred in 5 patients in pethidine group while 8 patients in tramadol group [Table/Fig-3]. The incidence of recurrence of shivering was 60% in pethidine group while only in 6% in tramadol group. [Table/ Fig-4].



4. Discussion

Around 40-60% of the patients under regional anaesthesia develop shivering. The probable mechanism under regional anaesthesia could be a result of decrease in body temperature due to loss of heat due to veno dilatation. Shivering is a potentially serious complication, resulting in increased metabolic rate; increased oxygen consumption along with raised carbon dioxide (CO₂) production; ventilation and cardiac output.

Adverse postoperative outcomes, such as wound infection; increased surgical bleeding. It causes lactic acidosis and interferes with pulse rate, blood pressure (BP) and electrocardiographic (ECG) monitoring. Shivering may happen as a response to hypothermia. However, shivering may also occur in normothermic patients.

Moreover, adequate body warming is not always possible. In selected surgical patients, we may therefore wish to prevent shivering by using pharmacological strategies.

Among the pharmacological methods of controlling shivering, Pethidine, whose anti-shivering effect is postulated to be mediated through kappa receptors.

Tramadol, prevents shivering by inhibiting the reuptake of norepinephrine and serotonin and activating the descending inhibitory spinal pathways. It also modulates the activity of nucleus median raphe acting centrally on the m opioid receptors predominately with minimum effects on k and d receptors.

Tramadol in a dose of 0.5mg/ kg iv has been shown to be effective in the treatment of perioperative shivering. Its pharmacodynamic advantage in causing less respiratory depression and sedation make it theoretically safer than pethidine. At such low doses none of the side effects were observed except nausea. We observed that shivering disappeared for 10 patients in group T and 0 in group P at 2 min. 13 patients in group T and 11 patients in group P at 5 min. At 15 min none of the patients had shivering.

5. Conclusion

Our study results showed that the two groups were similar in regard to the hemodynamic responses. But, tramadol reduced the occurrence of peri operative shivering more significantly than pethidine.

This study showed that tramadol is more effective for early control of shivering and its effect on recurrence of shivering is less than pethidine. . Tramadol cheaper and easily available as compared to Pethidine.

Hence we concluded that anti-shivering effect of tramadol is early and more effective compared to pethidine. This study was in accordance with the previous studies indicating that tramadol can control the anaesthetic shivering effectively.

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