

■ *Original Articles*

## Comparisons of tramadol with pethidine for prevention of post anaesthetic shivering in elective abdominal surgery

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### Abstract

**Background:** Postoperative shivering is a common event of unknown etiology. **Objectives:**

To compare the efficiency of tramadol with that of pethidine in controlling post anaesthetic shivering. **Methods:** This double – blind randomized clinical trial was performed on 120 consecutive patients who received general anaesthesia for elective abdominal surgery. Intravenous tramadol (1mg.kg<sup>-1</sup>) or pethidine (0.5mg.kg<sup>-1</sup>) was administered to alternate subjects who developed post anaesthetic shivering. They were monitored in the recovery room for 1 hour and the cessation time of shivering, recurrence of the events, duration of recovery, respiratory depression, arterial O<sub>2</sub> saturation, nausea and vomiting were recorded.

**Results:** Forty - eight patients (40%) had post anaesthetic shivering. In the tramadol group, shivering terminated within 5 minutes after injection. They had no recurrence of shivering, respiratory depression, reduction in SPO<sub>2</sub>, nausea and vomiting during the period of recovery. In the pethidine group, shivering terminated within 8 minutes after injection, but in 7 patients it recurred after 30 minutes. Similarly, 6 patients had respiratory depression, reduction in SPO<sub>2</sub> and 10 patients had nausea, vomiting but none of them needed further medication. **Conclusion:** Tramadol is superior to pethidine as it induces a faster termination of post anaesthetic shivering and does not entail adverse effects on the respiratory system.

**Keywords:** General anaesthesia post operative complication, tramadol, pethidine, post operative shivering.

### Introduction

Post operative shivering is a common complication that occurs in up to 60% of patients recovering from general anaesthesia and 30% after epidural anaesthesia.<sup>1</sup> Administration of halothane, enflurane and isoflurane has been associated with post anaesthesia shivering in more than 60% of cases.<sup>2</sup> The etiology is not clearly known, but the predisposing factors for post operative shivering are: heat loss, cold infusion or transfusion, general anaesthesia, and regional anaesthesia.<sup>1</sup> Mild shivering increase oxygen

consumption up to a level comparable to light exercise, where as intense shivering can increase oxygen consumption and carbondioxide production up to five hundred times<sup>1-2</sup> and thus increase the minute ventilation, heart rate, blood pressure, stroke volume, cardiac output, intraocular pressure and intra cranial pressure, thus secondary to an increase carbondioxide due to shivering.

In the patients with cardiopulmonary disfunction, who cannot afford the compensatory mechanisms, post anaesthesia shivering decreases the mixed venous blood oxygen saturation.<sup>1</sup> Moreover, hypoxia lactic acidosis and hypercarbia can complicate the recovery.<sup>1</sup> Therefore, in these patients post operative shivering must be prevented and controlled.

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Pethidine is an opioid with anti shivering effects through  $\mu$  and  $\kappa$  receptors. Intravenous pethidine (25mg) is effective in reducing post operative shivering, probably through  $\kappa$ -receptors in the thermoregulation centre. Tramadol is an analgesic which blocks the uptake of norepinephrine and 5-HT and has some affinity to  $\mu$  receptors, but not others opioid receptors. Thus, the present study was conducted with the aim of comparing tramadol 1mg. Kg<sup>-1</sup> and pethidine 0.5mg. Kg<sup>-1</sup> for prophylaxis of post anaesthetic shivering in adult patients undergoing surgical procedure under general anaesthesia.

### Methods

The study included 120 patients, ASA grade I or II, adult of either sex, scheduled for elective abdominal surgical procedures performed under general anaesthesia with expected duration of time 1-2 hours. Written informed consent was obtained from all patients included in the study groups. The patients were randomly allocated, using single randomization(double blinded technique) to one of the two groups of 60 patients in each group, according to the drug used to prevent shivering, patients received tramadol 1mg. Kg<sup>-1</sup>(group-T) or pethidine 0.5mg.Kg<sup>-1</sup>(group-P).

The patients undergoing urological endoscopic procedure or the procedures requiring the administration of blood or blood product were excluded. Patients with haemodynamic instability, raised intraocular pressure, raised intracranial pressure, history of seizure, multiple allergy, and those taking antidepressant drugs were also excluded.

All patients were premedicated with oral tablet alprazolam(0.5mg) given the night before and morning of surgery. In operation theatre an 18-G intravenous cannula was inserted and ringerlactated infusion started. In the operation theatre and recovery room, all the patients were monitored by pulse oxymeter electrocardiography and automatic blood pressure monitor. In the recovery room, all the patients were kept for one hour for monitoring. Operation theatre and recovery room temperature were maintained up to 24<sup>o</sup>c to 26<sup>o</sup>c, as is the usual practice in our institute.

Anaesthesia was induced with injection fentanyl 1.5 $\mu$ g, propofol 2mg. Kg<sup>-1</sup>, and Vecuronium bromide 0.1mg. Kg<sup>-1</sup>. Anaesthesia was maintained with oxygen, isoflurane, and top up dose of vecuronium bromide. Mechanical ventilation was adjusted to maintain normocarbida. After the surgery, patients were shifted to recovery room with cover of blanket, and were given oxygen 4-6 L/mint by the face mask. If the patients developed shivering, a second person who was not aware of the content of the syringes would administered intravenously A or B alternatively. The test drug was prepared by a person not involved in the study. To prevent the post operative nausea vomiting, intravenous ondansetron 4mg was administered at the end of surgery. The patients were reversed using injection neostigmine and glycopyrrolate.

### Statistics

Statistical analysis was performed using SPSS window version 13.0 (SPSS, Chicago II, USA.) The incidence of shivering, nausea and vomiting were compared among different groups using the chi-squared test and Fisher exact test. A value of P less than 0.05 was considered statistically significant.

### Results

Of 120 patients who developed post-anaesthetic shivering, 60 received pethidine, and the rest received tramadol. All of the patients received general anaesthesia for elective abdominal surgery. Baseline characteristics of the patients are presented in table 1. Two groups were not significantly different in the baseline characteristics.

It was seen that tramadol controlled shivering earlier and more effectively than pethidine, as there was no recurrence of shivering by tramadol and also all of the adverse effects observed in this study, occurred in the pethidine group (table2). The respiratory depression, nausea and vomiting that developed in the pethidine group were transient and resolved spontaneously.

Duration of recovery period was not significantly different between two groups (44  $\pm$ 10 in tramadol vs. 46 $\pm$ 12 in pethidine groups) and the patients of both groups had full recovery within 40-55 minutes and were transferred to the relevant wards.

**Table 1: Base line characteristics of the two study groups. Data are mean ± SD or n (%)**

	Pethidine	Tramadol	P value
Age (year)	35±10	36±8	0.545
Gender	Male	35(58.3%)	0.712
	Female	25(41.6%)	
Weight (kg)	55±10	53±12	0.321
Physical class	I	45(75%)	0.315
	II	15(25%)	

**Table 2: Outcomes following the administration of the medications. Data are meant ± SD or n(%)**

	Pethidine	Tramadol	P value
Cessation of Shivering(min)	8±1.5	5±1.2	<0.001
Recurrence of Shivering	7(11.6%)	0	0.006
Respiratory depression	6(10%)	0	0.011
Decreased SpO2	2(1.2%)	0	0.153
Nausea	6(10%)	0	0.011
Vomiting	4(6.6%)	0	0.041

### Discussion

Different pharmacological and non-pharmacologic modalities are used to control postoperative shivering.<sup>1</sup> In the current study we investigated the effect of intravenous pethadine and tramadol, for the management of post-anaesthetic shivering in the recovery room. Our results shows the superiority of tramadol over pethidine for the following reasons:1) Earlier onset of action (cessation of shivering); tramadol was effective with an average time of 3 minute eaalier than pethidine. 2) No recurrence of shivering with tramadol 3) No respiratory depression or decrease in SpO2 with tramadol 4) Less adverse effect and safe to use even by non anaesthetists.

Our results are in accordance with that of Bhatnagar's study<sup>2</sup> on higher efficacy of tramadol over pethidine in controlling the post operative shivering without recurrence. In another study, Tarkkila et al<sup>5</sup> compared the respiratory effects of tramadol and pethidine, observe that onlike pethidine (0.6mg/kg), equivalent dosage of tramadol did not lead to respiratory depression.<sup>4</sup>

Alfonsi et al<sup>5</sup> tried pethidine, fentanyl, and lidocaine for management of post anaesthetic shivering and observed that lidocaine was in effective, while

fentanyl control the shivering lesser than pethidine. Another study by Grundmann et al<sup>6</sup> on comparing the preventive effect of pethidine with that of clonidine for post anaesthetic shivering. They found that pethidine is less effective than clonidine.

Our second test drug, tramadol, was previously shown by Trekova<sup>14</sup> to be more effective than the placebo and without any adverse effects. Also, Mathew et al<sup>12</sup> showed the effectiveness of tramadol for prevention of post operative shivering as dose of 1 and 2 mg/kg with respective success rate of 96% and 98%, which are in the same range as our result of 100% success rate with a dose of 1mg/kg.

### Conclusion

Tramadol is better than pethidine to control post operative shivering with no side effects.

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