

## Intrathecal Meperidine and Shivering! Premium Non Nocere

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### Abstract

Shivering is one of the most discomforting side effects of hypothermia in patients emerging from anesthesia. Meperidine is currently widely used to treat shivering. However there are controversies about the intrathecal injection of this unique opiate in attenuating or else obtunding shivering.

**Keywords:** Shivering; Meperidine; Hypothermia

### Intrathecal Meperidine and Shivering!

Meperidine is currently widely used to treat shivering which is one of the most discomforting side effects of hypothermia in patients emerging from anesthesia. However there are controversies about the intrathecal injection of this unique opiate in attenuating or else obtunding shivering.

The incidence of shivering has been reported to be 6%-66% after anesthesia and occurs in up to 50% of unwarmed cases following spinal anesthesia [1]. Losing heat in combination with inhibited hypothalamic thermoregulation reflexes by anesthetic drugs is responsible for a decline of core temperature during anesthesia. In fact, hypnotics and some other drugs reduce the thermoregulation threshold, while the patient is losing heat by various routes in the operating room. Thus, no thermoregulatory mechanism is elicited during the hypothermic condition under anesthesia. While recovering from anesthesia, the thermoregulation response returns to the preanesthetic state and compensatory reflexes such as shivering start. Apart from patient discomfort, shivering increases the metabolic rate by up to 600% and increases adverse cardiovascular events. Some pharmacologic and non-pharmacologic interventions have been introduced to prevent and treat shivering, but none are foolproof.

The local anesthetic characteristic of meperidine was described by Eisleb and Schaumann for the first time in 1939. About 45 years later, Mircea et al. and then Cousins et al. published reports of spinal and saddle anesthesia by using intrathecal meperidine (IM) as the sole agent [2]. Till to date, doses up to 100 mg have been reported for the same purpose. Later, lower doses of IM in combination with local anesthetics had been tried to extend postoperative analgesia [3]. Increased intraoperative nausea and vomiting, respiratory depression, pruritus, and emesis are known and common side effects of IM.

Meperidine is a potent and inexpensive antishivering drug presently available. Its efficacy to decrease the intensity and prevalence of postanesthetic shivering has been confirmed by many studies in doses ranging between 0.1-0.5 mg/kg of body weight. Of course, these good results should be considered with annoying side effects of the drug. A group of studies have only focused on the antishivering effect of IM and thus concluded that it could effectively control shivering [4-6]. These studies have documented the antishivering effects of IM but have

not dilated on the adverse effects of nausea and vomiting either because they were not their primary end points or else their sample size was too small to reveal these side effects. Others have mostly dwelt on the adverse effects of IM which had been obviously annoying for the patients and thus it could be concluded that either the use of IM be altogether avoided if possible or else its dose be curtailed to the minimum possible level to obviate the agonizing side effects of nausea, vomiting and pruritus [7-9].

In most of the reviews, IM has not been established for routine use as the first-line agent to prevent shivering. Since IM enhances sedation and if it is coupled with vomiting in an obtunded and sedated patient, it could end up in pulmonary aspiration together with its devastating sequel. Shivering is troublesome and ought to be treated, but at the same time its treatment should not usher in other complications which can make matters worse both for the patient and the attending physician.

Since no other drug is in the offing to tackle shivering except clonidine which has its own problems and 5HT3 blockers which are only used intravenously and not recommended for intrathecal injection, it appears that meperidine would continue to be used as an antishivering agent in the years to come till its substitute becomes available. However, in order to curtail the highly annoying side effects of meperidine, it is suggested that the drug be used only via the intravenous route to treat shivering once it occurs and should be avoided intrathecally as a prophylactic agent. Since all the patients do not suffer from shivering, it seems logical and pragmatic to use this drug only and solely for treatment purposes because it has a high potential in causing nausea and vomiting. Apart from that, drugs such as ondansetron or granisetron can also be used in treating the diabolical side effect of shivering once it ensues. It is commonly being held that prevention is better than cure, in case of shivering, preferably no prophylactic regimen should be tried specially IM, and treatment with meperidine initiated intravenously once the onslaught of shivering is clinically noticed.

Treatment providers should not restrict themselves to prevent shivering solely with drugs, as warming maneuvers and in turn fighting hypothermia will still be safer. However we would emphasize that if IM is necessary to be used as a weapon against shivering, its dose should be reduced to the minimal effective dose. Such treatment protocols would go a long way in tackling and attenuating the side effects of nausea and vomiting and at the same time avoiding the

occurrence of these side effects which are frequently encountered after IM in an overwhelming number of patients. Lastly, we would like to quote a famous phrase from Hippocrates, "Primum non nocere".

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