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Efficacy of Nalbuphine versus Tramadol in the Treatment of Shivering Following Spinal Anaesthesia

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Abstract: ***Background: Shivering following spinal anaesthesia is a common perioperative complication associated with increased metabolic demand, oxygen consumption, and patient discomfort. Pharmacological agents such as tramadol and nalbuphine have been used for its management, but their comparative efficacy remains a subject of clinical interest. Aim: To compare the efficacy and safety of intravenous nalbuphine and tramadol in the treatment of post-spinal anaesthesia shivering. Materials and Methods: This randomized clinical study was conducted on 40 patients aged 20–60 years, belonging to American Society of Anaesthesiologists (ASA) physical status I and II, who developed shivering following spinal anaesthesia for lower limb orthopaedic surgery. Patients were randomly allocated into two groups of 20 each. Group T received tramadol 1 mg/kg intravenously, and Group N received nalbuphine 0.1 mg/kg intravenously. Time to cessation of shivering, recurrence, sedation level, and adverse effects were assessed. Statistical analysis was performed using Student's t-test and Chi-square test. Results: The mean time for disappearance of shivering was significantly shorter in the nalbuphine group compared to the tramadol group. Complete control of shivering was observed in all patients receiving nalbuphine, whereas partial response and recurrence were noted in the tramadol group. Sedation was better with nalbuphine, and adverse effects such as nausea and vomiting were observed only with tramadol. Conclusion: Nalbuphine is superior to tramadol in controlling post-spinal anaesthesia shivering, providing faster relief, better sedation, and fewer side-effects.***

Keywords: Post-spinal shivering, Nalbuphine, Tramadol, Spinal anaesthesia

1. Introduction

Post-anaesthetic shivering is a frequent complication of neuraxial anaesthesia, with reported incidence ranging from 40% to 70%.[1] The primary mechanism involves perioperative hypothermia resulting from redistribution of core body heat to peripheral compartments and impairment of thermoregulatory control during spinal anaesthesia.[2],[3]

Shivering significantly increases oxygen consumption, carbon dioxide production, and sympathetic activity, which may be detrimental in patients with limited cardiopulmonary reserve.[3] In addition, it causes patient discomfort, interferes with monitoring, and may delay postoperative recovery. Various pharmacological agents acting on opioid, serotonergic, and adrenergic pathways have been used to treat post-spinal shivering.[4]

Tramadol, a centrally acting opioid analgesic, has shown good efficacy in controlling shivering but is associated with adverse effects such as nausea, vomiting, and dizziness.[5] Nalbuphine, a mixed opioid agonist-antagonist with κ-receptor agonist activity, has been reported to provide effective control of shivering with better sedation and fewer side-effects.[6]

The present study was undertaken to compare the efficacy of nalbuphine and tramadol in the management of post-spinal anaesthesia shivering.

2. Materials and Methods

This randomized controlled study was conducted in the Department of Anaesthesiology and Critical Care, Hi-Tech Medical College and Hospital, after obtaining approval from the Institutional Ethics Committee. Written informed consent was obtained from all participants.

Study Population

A total of 40 patients aged 20–60 years, belonging to ASA physical status I and II, undergoing elective lower limb orthopaedic surgery under spinal anaesthesia and developing shivering of grade 1 or more were included.

Exclusion Criteria

Patients with cardiovascular disease, thyroid disorders, known allergy to study drugs, history of substance abuse, or autonomic neuropathy were excluded.

Randomization and Intervention

Patients were randomly allocated into two groups of 20 each:

- Group T (n = 20): Tramadol 1 mg/kg IV
- Group N (n = 20): Nalbuphine 0.1 mg/kg IV

Shivering was graded using a five-point shivering scale. Time taken for complete cessation of shivering, recurrence, sedation level assessed using Ramsay Sedation Score, and adverse effects were recorded.

Statistical Analysis
Data were analysed using SPSS software. Continuous variables were analysed using Student's *t*-test and categorical variables using Chi-square test. A *p*-value <0.05 was considered statistically significant.

3. Results

All 40 patients completed the study. Demographic parameters such as age, sex, weight, ASA grade, and duration of surgery were comparable between the two groups.

The mean time taken for disappearance of shivering was significantly shorter in the nalbuphine group compared to the tramadol group (p <0.05). Complete control of shivering was achieved in all patients receiving nalbuphine, whereas partial response and recurrence of shivering were observed in the tramadol group.

Sedation was more satisfactory in the nalbuphine group. Adverse effects such as nausea and vomiting were observed only in the tramadol group. No significant haemodynamic instability was noted in either group.

4. Discussion

Shivering following spinal anaesthesia is primarily caused by impaired thermoregulation and redistribution of heat.[1],[3] In the present study, both nalbuphine and tramadol were effective in controlling post-spinal shivering; however, nalbuphine demonstrated superior efficacy.

The faster onset of action and complete control of shivering observed with nalbuphine may be attributed to its κ-opioid receptor agonist activity, which plays a significant role in thermoregulation.[6] Similar findings have been reported in previous comparative studies evaluating nalbuphine and tramadol.[7],[8]

Tramadol, although effective, was associated with a higher incidence of nausea and vomiting, consistent with earlier reports.[5] Better sedation observed with nalbuphine improved patient comfort without causing respiratory depression.

5. Conclusion

In this study involving 40 patients, nalbuphine was found to be superior to tramadol in the treatment of post-spinal anaesthesia shivering. Nalbuphine provided faster and complete control of shivering, better sedation, and fewer adverse effects. Nalbuphine may be considered a preferred agent for managing post-spinal anaesthesia shivering.

Ethical Approval
Institutional Ethics Committee approval was obtained. Written informed consent was taken from all participants.

Conflict of Interest
None declared.

Funding
Nil.

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