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Original Article

Study Of Intavenous Dexamethasone Versus Tramadol For The Prevention Of Shivering In Patients Undergoing General Anaesthesia

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Abstract

Background: Postoperative shivering is a common experience for patients operated under general anaesthesia (GA). The reasons for shivering include: reduction in the vasoconstriction threshold, redistribution of the temperature from the core to the peripheral tissues and peripheral vasodilation caused by anaesthetic drugs. The incidence of post anaesthetic shivering (PAS) has been reported to range from 60-75% in patients recovering from GA.

Objective Of The Study: The objective of the study is to compare the efficacy of dexamethasone and tramadol in the treatment of post-general anaesthesia (GA) shivering as well as to compare their side-effect profile.

Methods: We included a total of 180 patients who were undergoing surgery under general anaesthesia. These patients were randomly allocated into three groups by the computer-generated Group number (D/T/S) which was put in a closed opaque envelope. Nursing staff (person not related to study), anaesthesia nurse was asked to open the closed envelope containing computer generated group number on start of shivering in the patient. She prepared the drug in 10 ml syringe and sent it for use without labelling which drug it was, but she kept a record of the same. The study drug was prepared as a 10-mL solution in a syringe by a person not involved in the study. Both the patient and the person who was conducting the case, administering the study drug and observing the patient for the outcome measures in the post-operative period were blinded to the group allocation. Group D: Dexamethasone 0.1 mg/kg diluted with NS upto 10 mL, Group T: Tramadol 1 mg/kg diluted with NS upto 10 mL and Group S: normal saline 10 mL.

Results: In this study, which was done on patients undergoing elective surgery under general anaesthesia, the drugs of tramadol, dexamethasone, and placebo were used and their effects on the prevention and control of postoperative shivering were evaluated. We found that the incidence of shivering was significantly lower in Dexamethasone group compared to Tramadol and placebo group. Similarly, the incidence of PONV was lower in Dexamethasone group compared to Group T and Group S.

Conclusions: In the present study, we found that the incidence of shivering was significantly lower in Dexamethasone group compared to Tramadol and placebo group. Similarly, the incidence of PONV was lower in Dexamethasone group compared to Group T and Group S. This study shows that the dexamethasone is beneficial, as it is holding both properties (anti-shivering and anti-emetic), so it is better to prefer dexamethasone over tramadol in prevention of shivering and PONV.

Keywords: shivering, post-operative nausea vomiting, general anesthesia, tramadol, dexametha sone.

INTRODUCTION:

Postoperative shivering is a common experience for patients operated under general anaesthesia (GA). The reasons for shivering include: reduction in the vasoconstriction threshold, redistribution of the temperature from the core to the peripheral tissues and peripheral vasodilation caused by anaesthetic drugs. The incidence of post anaesthetic shivering (PAS) has been reported to range from 60-75% in patients recovering from GA. [1]

Various pharmacological and non-pharmacological methods can be used to prevent and control PAS. Tramadol, a centrally acting opioid with action mainly on the μ-receptor and minimal activity on the κ- and δ-receptors, has anti-shivering activity mainly due to its opioid and serotonergic or noradrenergic activity or both. [1] However, this drug is associated with an increased incidence of postoperative nausea vomiting (PONV). Hence there is a need for better pharmacological agent which can minimize PONV One such medication is, use of Dexamethasone which has shown better results but the studies are limited. There are some studies which have shown that both the drugs are equally effective. Dexamethasone, a synthetic adreno-corticosteroid with glucocorticoid activity, may have a role in reducing the PAS. The mechanism for this effect may be due to its property to reduce the gradient between the skin and core body temperature. Another proposed mechanism of anti-shivering action is by regulating immune responses. In one of the studies, dexamethasone has also been shown to be superior to pethidine as an anti-shivering agent. It also has anti-emetic properties which have been reported to be comparable to ondansetron in the immediate post-operative period. [2-5]

OBJECTIVES OF THE STUDY:

The objective of the study is to compare the efficacy of dexamethasone and tramadol in the treatment of post-general anaesthesia (GA) shivering as well as to compare their side-effect profile.

MATERIALS AND METHODS:

Source of study: This present study is a prospective double-blind, randomised clinical study, conducted at Dept. of Anaesthesia at Pt JNM Medical College Hospital in the patients undergoing general surgery procedures.

Inclusion criteria: Present study was conducted in the patients aged 18-60 years undergoing scheduled elective surgery under general anaesthesia of duration less than 2.5 hours who were randomized and included in the study.

Exclusion Criteria: We excluded the patients with h/o smoking, motion sickness, myocardial infarction, neuromuscular disorders, hypothyroidism, hyperthyroidism, pregnant and lactating women, fever, raised ICT, patients on anti-depressant medications and corticosteroid therapy.

Data collection and methodology: we included a total of 180 patients who were undergoing surgery under general Anaesthesia, these patients were randomly allocated into three groups by the computer-generated Group number (A/B/S) put in a closed opaque envelope. Nursing staff (person not related to study), anaesthesia nurse was asked to open the closed envelope containing computer

generated group number on start of shivering in the patient. She prepared the drug in 10 ml syringe and sent it for use without labelling which drug it was, but she kept a record of the same. If the second dose of the drug was required, she again sent it in an unlabelled syringe. The administering anaesthesiologist was not knowing which drug was being given. He would fill up the study proforma noting down the various parameters, and this proforma would be collected again by the anaesthesia nurse who would put it back in the torn envelope. At the end of the study, these envelopes were handed to the principal investigator. All patients were monitored by non-invasive blood pressure (NIBP), pulse rate, SpO_2 and axillary temperature. The study drug was prepared as a 10-mL solution in a syringe by a person not involved in the study. Both the patient and the person who was conducting the case, administering the study drug and observing the patient for the outcome measures in the post-operative period were blinded to the group allocation. Group D: Dexamethasone 0.1 mg/kg diluted with NS upto 10 mL, Group T: Tramadol 1 mg/kg diluted with NS upto 10 mL and Group S: normal saline 10 mL. All patients were pre-medicated with tablet ranitidine 150 mg and alprazolam 0.25 mg orally night before and in the morning of surgery. In the preoperative room, baseline oral temperature was measured and recorded.

Standards monitors including electrocardiography, non-invasive blood pressure monitoring, pulse-oximetry was attached in the operating room (OR). The OR temperature was recorded. Anaesthesia was induced with morphine 0.1mg.kg^{-1} i.v. and propofol 2 mg.kg^{-1} i.v. vecuronium 0.08 mg.kg^{-1} i.v. was used to facilitate tracheal intubation. Anaesthesia was maintained with 33% oxygen in N_2O, isoflurane and intermittent top-up doses of vecuronium. After intubation a nasopharyngeal temperature probe was inserted for continuous nasopharyngeal temperature monitoring. Temperature readings recorded were, immediately after intubation, just before extubation and the lowest temperature attained during intraoperative period. Study drug was administered intravenously just after induction. Neuromuscular blockade was reversed using appropriate doses of neostigmine and glycopyrrolate i.v. and the trachea was extubated. No active or passive warming devices were used intraoperatively or postoperatively. Patients were then shifted to the recovery room where they were continuously observed for occurrence of shivering, nausea and vomiting. Severity of shivering, nausea and vomiting was graded respectively. Grades of shivering include: 0-no shivering, 1-mild fasciculation's of face or neck, 2-visible tremor involving more than one muscle group, 3-gross muscular activity involving entire body. A rescue dose of pethidine 25 mg i.v. was administered to treat shivering grade ≥2. Ondansetron 4 mg i.v. was given to treat nausea/vomiting grade ≥2 (grading of nausea and vomiting include: 0-no nausea vomiting, 1-nausea without vomiting, 2-nausea with vomiting <3 episodes, 3-nausea with vomiting >3 episodes. Pulse rate and blood pressure were recorded immediately after shifting to recovery room and then at half hourly intervals in the recovery room up to 2h. Any other complications occurring in the postoperative period were also recorded. Total amount of IV fluids transfused during the surgery was also recorded. Statistical analysis was performed using SPSS program for windows, version 20.0. One time measured quantitative parameters which followed the normal distribution were compared using unpaired t-test and qualitative parameters using Chi-square. Repetitively measured quantitative measures were compared by repeated measure ANOVA and qualitative measures by Chi-square. P-value < 0.05 was considered significant.

RESULTS:

Table 1 shows the demographic characters of the subjects studied.

Table 1: Shows the demographic profile of the subjects included in the study

	Group D (no=60)	Group T (no=60)	Group S (no=60)
Age (in years)	39.37 ± 4.2	42.37 ± 3.98	41.37 ± 2.8
Weight (kg)	55.3 ± 3.4	56.3 ± 2.8	54.8 ± 2.17

Gender M/F	32:28	34:24	27:33
Duration of anesthesia in minutes	105.3 ± 29.87	108.3 ± 26.68	104.8 ± 26.89

Table 2: Shows the incidence of shivering and post-operative nausea and vomiting

	Group D	Group T	Group S
Shivering	21%	11%	52%
PONV	18%	54%	60%

DISCUSSION:

In the present study, we compared the incidence of shivering and post-operative nausea and vomiting in patients who underwent surgery under GA. The study included a total of 180 patients as per inclusion and exclusion criteria, randomised the subjects into 3 groups (Group D, T and S) each group comprised of 60 patients each. In this study, we studied the efficacy of dexamethasone in the treatment of post-GA shivering in adults and compared its efficacy with tramadol for the treatment of shivering after GA in patients undergoing various surgeries. Although tramadol is an established drug in the treatment of shivering, in this study, we found that dexamethasone is more effective compared to tramadol in treating post-GA shivering. Prevention and treatment of postoperative shivering form an important part of patient care after surgery. Since, it may cause sympathetic stimulation, increased oxygen consumption, or increased production of carbon dioxide, and hereby hurt the patient severely.

In this study, which was done on patients undergoing elective surgery under general anesthesia, the drugs of tramadol, dexamethasone, and placebo were used and their effects on the prevention and control of postoperative shivering were evaluated. Dexamethasone can decrease the temperature gradient between core and skin via its anti-inflammatory action and inhibition of the release of vasoconstrictors and pyrogenic cytokines [6].

In the present study, we found that the incidence of shivering was significantly lower in Dexamethasone group than Tramadol group and placebo group. Similarly, the incidence of PONV was lower in Dexamethasone group compared to Group T and Group S. This study shows that the dexamethasone is beneficial, as it is holding both properties (anti-shivering and anti-emetic), so it is better to prefer dexamethasone over tramadol in prevention of shivering and PONV.
The efficacy of dexamethasone as an anti-shivering agent administered post-induction of anaesthesia has been proven in previous studies. The study by Yared et al used dexamethasone in a very high dose (0.6 mg/kg) and was conducted on patients undergoing cardiac surgery. In this dose, the incidence of shivering was reduced from 33% in control group to 13.1% in dexamethasone group. Lower dose of 0.25 mg/kg dexamethasone also proved effective in reducing shivering to 16.7% compared to 40% in control group [6, 7].

Studies have proven that tramadol is effective as prophylactic anti-shivering agent and also for its management in the postoperative period in a dose of 1 $mg.kg^{-1}$. Some of these studies state the superiority of tramadol in this dose over pethidine 0.5 $mg.kg^{-1}$ [8-10].

CONCLUSION:

In the present study, we found that the incidence of shivering was significantly lower in Dexamethasone group compared to Tramadol and placebo group. Similarly, the incidence of PONV was lower in Dexamethasone group compared to Group T and Group S. This study shows that the dexamethasone is beneficial, as it is holding both properties (anti-shivering and anti-

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