ORIGINAL ARTICLE

Comparative Study of Tramadol versus Ketamine for Postoperative Shivering

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ABSTRACT

Background: Regional anesthesia may impair thermoregulatory control and results in of shivering in patients undergoing surgery in regional anesthesia. Shivering increases metabolic rate and oxygen consumption. Certain medical methods are used in preventing shivering.
Aim: To compare the frequency of intra operative shivering with intravenous tramadol and ketamine in patients undergoing infra-umbilical surgery under spinal anaesthesia.
Study Design: Randomized Clinical Trial.
Setting: Operation Theatres, Jinnah Hospital Lahore. **Duration:**6 Months.
Data Collection Procedure: 200 cases were enrolled and divided randomly in 2 groups. In group "T", Tramadol 1mg/kg was infused and in group "K", Ketamine 0.5mg/kg was infused 5min earlier spinal anesthesia. All patients were examined for shivering by using four point scale after 15, 30, 45, 60 mins.
Results: The mean age in Group T was 32.12±9.30 years and in Group K was 33.37±9.40 years. (P = 0.068). At 60 min after spinal anesthesia, in Group T, shivering was observed 6(6%) of patients where as in Group K, it was observed in 32.0% (n=32) of patients. (P = 0.001)
Conclusion: Frequency of intra operative shivering with intravenous tramadol is less than ketamine in patient undergoing infra-umbilical surgery under spinal anaesthesia.
Key words: Shivering, Ketamine, Tramadol, Spinal Anesthesia

INTRODUCTION

Shivering is a defensive phenomenon which results in production of heat due to muscles' dynamic instinctive activity, to reimburse reduced body temperature of a normal healthy human being. At molecular level, reflex protective mechanism against cold gets kick started on perception of lower temperature by the preoptic nucleus of hypothalamus.[1] The neurological mechanism of shivering is mediated by spinal α-motor neurons & axons[2].

Spinal anaesthesia is a safe and wide spread method used in many lower abdominal surgeries. But it may alter the thermoregulatory control of body and around 57% shivering attack cases have been reported during spinal anesthesia[3]. Spinalanesthesia yields vasodilatation that enables core-to-peripheral relocation of body heat[4]. This causes loss of body heat which cause shivering, which may have possibly damaging effects[5]. It may be much unfriendly and physically depressive or stressful for patients, as mild shivering amplify the oxygen consumption, however severe shivering amplify metabolism as well as oxygen consumption from 100-600%[6].

Tramadol is easily available drug which does not cause sedation and hallucination compared to ketamine and may be the good alternative to ketamine. Previous literature shows variable frequency of shivering with tramadol. So that why I want to compare ketamine and tramadol in our population for prevention of intra operative shivering so that patients with regional anesthesia can be managed without common complication of shivering by choosing better drug.

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The objective of the study was to compare the frequency of intra operative shivering with intravenous Tramadol and Ketamine in patient undergoing infra-umbilical surgery under spinal anaesthesia

MATERIALS AND METHODS

This randomized Control Trail was conducted in operation theatres of Jinnah Hospital Lahore from 31- May-2013 to 30 Nov 2013. Simple Random Sampling technique was used. Sample size was Ref Sample Size Calc 2.0
Power of test = 80% Level of significance = 5%
Frequency of shivering in ketamine groups = 23.3 %
Frequency of shivering in tramadol group = 8.8 %
Calculated sample size 200 (100 in each group)
Inclusion criteria:

- Patients ASA Class I and II. (Annexure II attached)
- Age group 15-50 years of both gender
- Patients undergoing elective infra umbilical surgery under spinal anaesthesia.

Exclusion criteria:

- Patients with history of hypo- or hyperthyroidism (diagnosed on history, examination and TFTs)
- Patients undergoing obstetrical surgeries, transfusion of blood required intraoperatively
- Low body temperature <38.0^{0}C
- Patient with established contraindications for regional anesthesia
- Patients addicted with alcohol or narcotics

Data collection procedure: Two hundred adult patients of ASA physical status I and II, fulfilling inclusion criteria were enrolled after taking informed consent. Patients were divided randomly in 2 groups. Group "T" was infused with Tramadol 1mg/kg and group "K" was infused with Ketamine 0.5mg/kg earlier than spinal anaesthesia. In operating theatre, ECG monitor was attached and pre-warmed

Ringer lactate was loaded to a temperature of approximately 37ºC at 10ml/kg of over 15 minutes. Room temperature was maintained at 22ºC±1ºC. Drug was randomly injected intravenously 5 minutes before induction of spinal anaesthesia. With all aseptic precautions SAB was performed in L3-L4 space while sitting, with 25G Quincke's spinal needle (sterile &disposable)with 15mg of0.75% bupivacaine. Constantly ECG, respiratory rate, consciousness, sedation, oxygen saturation, axillary body temperature, BP were monitored. Then oxygen inhalation was given at rate of 4liters/min. All cases were screened for shivering (Involuntary contraction of skeletal muscles of body. Defined on 4 point "The Bedside Shivering Assessment Scale**"**) if any on four point scale at 15, 30, 45, 60 mins all this information was recorded in predesigned performa.

Data analysis: Collected information was entered and analysed by SPSS 21.0. Mean±SD was calculated for age and frequency & percentage was calculated for gender & shivering. Percentage of shivering was compared between the groups by Chi Square test with P-value ≤0.05 taken significant.

RESULTS

The mean age in Group T was 32.12±9.30 years and in Group K was 33.37±9.40 years. In Group T, there were 44(44%) male and 56(56%) female patients while in Group K, there were 33(33%) male and 67(67%) female patients. ASA status I and II patients were included in this study. Group T had 49(49%) patients of ASA class I, and 51 (51.0%) patients of ASA class II. Group K had 36(36%) patients of ASA class I and 64(64%) patients of ASA class II (Table 1).

After 15 min of spinal anesthesia, 8.0% (n=8) patients in Group T and 42(42%) in Group K showed shivering. At 60 min, In Group T, shivering was observed 6(6%) of patients where as in Group K, it was observed in 32(32%) of patients. (P=0.001) (Table 2).

Table 1: Baseline characteristics of patients

Group	T(n=100)	K(n=100)
Age (Years)	32.12 + 9.30	33.37 + 9.4
Male	44	33
Female	55	67
ASA status		
I	49	36
II	51	64

Table 2: Comparison of shivering in both groups

Time	Shivering	Group T (n=100)	Group K (n=100)	p-value
15 min	Yes	8(8%)	42(42%)	<0.001
30 Min	Yes	7(7%)	35(35%)	<0.001
45 Min	Yes	7(7%)	36(36%)	<0.001
60 Min	Yes	6 (6%)	32(32%)	<0.001

DISCUSSION

Spinal anaesthesia includes central neural& peripheral nerve blockade. So it is considered to be safe & famous technique in several surgical procedures[7]. Hypothermia & shivering due to spinal anaesthesia are very common,[8] and these can be as severe as observed in general anaesthesia[9].

There are 3 main causes of hypothermia after spinal anaesthesia. Firstly, spinal anaesthesia causes an internal re-distribution of body heat from head to toes[10]. Secondly, due to loss of thermos-regulatory vaso-constriction below spinal block level, there is elevated loss of heat from body surfaces. Third, there is transformed thermoregulation after spinal anaesthesia, which is characterized by 0.5ºC reduction in vasoconstriction & shivering thresholds[11].

To prevent and treat shivering, various techniques have been used. These use physical method such as warm operative room temperature, infusion of warm fluids.[12] Certain medicines can be used in spinal anesthesia like meperidine[13], clonidine, ketansrin[14], anticholinergics[15] opiate agonists, dexamethasone and tramadol[16].

In our study, it has been shown that prophylactic use of 1mg/kg intravenous tramadol is better than 0.5mg/kg ketamine infusion to prevent shivering after conducting a surgery under spinal anaesthesia.

Non-medical techniques to maintain normal body temperature are effective but these arecostly and are not practical everywhere[4]. Medical methods like ketamine, pethedine, tramadol, Clonidine etc. have been tried for prevention of shivering intra and postoperatively[17,18,19]. Ketamine amplifies arterial pressure, heart rate and cardiac output. This may be due to direct central sympathetic stimulation &deters nor-epinephrine acceptance into post-ganglionic sympathetic nerve endings and can decline head-to-toe re-distribution of heat. Honarmand et al[3] concluded that ketamine 0.5mg/Kg given prophylactically was effective in prevention of postoperative shivering compared to placebo and reported frequency of shivering in Ketamine group 23.3% vs placebo 60%.

Tramadol is analgesic drugthat act centrally. It inhibits the neuronal uptake of nor-adrenalin in spinal cord and boosts hydroxytriptamine excretion, which effects center for regulation of body temperature. Javaherforoosh et al[20] concluded that tramadol was effective in preventing shivering. Frequency of shivering 8.8% compared to placebo 86.6%.

Talakaub et al[21], infused tramadol in order to prevent shivering, after spinal anaesthesia. The shivering occurred in 3% only with prophylactic tramadol. Javaher for oosh Fatemeh et al[20]. in another study has reported frequency of shivering in 8.8% compared to placebo 86.6% in patients who were given intravenous tramadol for prevention of shivering.

Gangopadhyay showed that incidences of shivering with ketamine 13% which was less in contrast to tramadol 40%[19]. Honarmand et al., used prophylactic ketamine 0.5mg/kg to avert postoperative shivering compared to placebo and reported frequency of shivering in Ketamine group 23.3% vs placebo 60%[3].

The anti-shivering effect of tramadol is different from many other drugs. It has insignificant effect on ê-receptor. The anti-shivering action are facilitated by serotoninergic or nor-adrenergic receptor or may be by both[22].

Ketamine is an N-Methyl-D-aspartate receptor antagonist, also obstructs& averts peri-operative shivering. It is probable that N-Methyl-D-aspartate receptor antagonist controls thermoregulation at different levels. Additionally,

being competitive N-Methyl-D-aspartate receptor antagonist, ketamine has numerous other properties. Consequently, it possibly controls shivering by non-shivering thermogenesis either by exploiting on hypothalamus, or by β-adrenergic effects of nor-epinephrine[23].

Ketamine causes hallucination, sedation but these side effects are dose dependent. We have used 0.5mg/kg intravenous ketamine before spinal anesthesia. Same dose was used by Dal et al for prevention of shivering and there were no such side effects at this dose.[22]

CONCLUSION

From our study, it can be concluded that frequency of intra operative shivering with intravenous 1mg/kg tramadol is less than 0.5mg/kg ketamine in patient undergoing infra-umbilical surgery under spinal anaesthesia

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