Original Research Article

Comparison of intrathecal ketamine, clonidine and tramadol for the prevention of shivering during spinal anesthesia: A double blind study

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Abstract

Background: In patients undergoing neuraxial anesthesia, heat loss and core to peripheral redistribution of body heat causes the core temperature to decrease. Shivering has deleterious metabolic and cardiovascular effects. Hence to prevent shivering by pharmacological effect the double-blind comparison of ketamine, clonidine and tramadol was used to control the shivering in neuraxial anesthesia **Method:** 96, patients were classified in 3 groups of each 32 patients. Group A-received ketamine Group B- received clonidine. Group C-received tramadol. Drug was administrated intrathecally. **Results:** In the study of different groups shivering in all 3 groups were well controlled and ANOVAs test Df was 0.04 and P>0.05 (insignificant). In the sedation score study all three groups did not report any deleterious side effects ANOVAs test had Df- 0.114 P>0.89 (in-significant). In demographical profile Ketamine (group A) significantly maintained BP and heart rate as compared to other groups. **Conclusion:** Among all three drugs Ketamine was more beneficial becauseof improvedhemodynamics apart from prophylaxis to decrease shivering. It sedates the patients effectively, with prolonged comfortability of patients during surgery.

Key Words: Ketamine, Clonidine, Tramadol, Neuraxial, Shivering

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INTRODUCTION

In patients undergoing neuraxial anesthesia heat loss and core to peripheral redistribution of body heat causes the core temperature to decrease. The shivering threshold is reached soon and more shivering is required to prevent further hypothermia[1,2]. Because shivering is a potentially serious complication, resulting in increased metabolic rate, increased oxygen consumption (up to 100-600) along the raised carbon dioxide (CO_2) production, and ventilation and cardiac output. The adverse post-operative out-comes would be, wound infection, increased surgical bleeding and morbid cardiac events. It causes arterial hypoxemia, lactic acidosis, increased intra ocular pressure (IOP) increased intra cranial pressure (ICP) and interferes with pulse rate, blood pressure (BP) and electrocardiographic (ECG) monitoring.[3,4] Due to shivering and thermal discomfort. the quality of patient's recovery suffers, moreover, shivering per se may aggravate post-operative pain, simply by stretching of surgical incision. Hence pharmacological methods using different drugs, which have prophylactic anti-shivering properties and control other side effects are used.

MATERIAL AND METHODS

96 patients aged between 19 to 65years admitted for surgery in General hospital Jayanagar 4th block T Bangalore-41 were studied.

Inclusive criteria- 96 patients having ASA grade I and II, undergoing lower abdominal (perineum) or lower limb surgery were Included in the study.

Exclusion criteria– The patients suffering from hypothyroidism, neuro- muscular disease, history of

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cardio-pulmonary disease, psychological disease, immune- compromised patients were excluded from the study.

Method-After getting the fitness certificate from physician, 96 patients wereclassified into three group A,B, and C. All the patients were pre-loaded with ringer lactate p10ml/kg before giving neuroaxail blockage. The study drug and saline were pre-heated to 37 degree centigrade before administration.

Group A- 32 patients received preservative free ketamine 20 mg with 3ml Bupivacaine 0.5 % heavy.

Group B-32 patients received clonidine 20 micrograms with 3 mlBupivacaine 0.5 % heavy.

Group-C-32 patients received preservative free Tramadol20 mg with 3 mlBupivacaine 0.5 % heavy.

I.v fluids were warmed to 37 degree centigrade before using them for the patients. The temperature of the OT(Operation Theater) was maintained at 24 degree centigrade for all three groups of patients (32X3=96).Spinal subarachnoid block was instituted at either L3-L4 or L4-L5 interspace using 25 gauge Quinke spinal needle. 3 ml of hyperbaric Bupivacaine 0.5% heavyalong with the drug under study and the total volume was made to 3.5 ml using normal saline. During the intra-operative period after noting the baseline parameters, pulse rate, non-invasive blood pressure (NIBP), oxygen saturation, temperature (core and surface) and level of sensory block were assessed at every 5 minutes intervals till there was no change in the level of anesthesia and every 15 minutes thereafter. The core temperature was measured by nasopharyngealthermometer and surface temperature by an axially thermometer. Shivering was graded using a scale validated by Tsai and chu5. Grade 0(Zero)=No. shivering grade I= piloerection but no visible shivering. Grade II = Muscular activity in only one muscle group, Grade-III muscular activity in more than one muscles groups but not generalized. Grade-IV shivering involves the whole body. During surgery, shivering scale was recorded at every 5 minutes intervals upto 90 minutes of surgery. The prophylaxis was regarded as ineffective if the patient's exhibit grade-III shivering any time during the study and I.V Fentanyl 25micrograms was administrated as a rescue drug. The side-effects such as hypotension, nausea, vomiting, hallucinations and sedation were also recorded. Hypotension was defined as decrease in mean blood pressure (MBP) of more than 20% from the base line. Hypotension was treated with IV incremental bolus dose of Mephentermine3mg and further I.V infusion of ringer lactate via 16 g cannula. If patients develop. Nausea and vomiting was treated with IV metocolopromide 10 mg . Hallucinations as a side effect was defined as false sensory experience, when the patients reported that they saw, heard smelled, tasted or felt something that was non-existent. The degree of sedation was on 5-point scale. 1-Fully awake and oriented, 2-Drowsy, 3-Eyes closed but arousableto mild to command, 4-Eyes closed but arousable to mild physical stimulation, 5-Eye closed but unarousable to mild physical stimulation .

Statistical analysis- Analysis findings of all three groups (shivering and sedation scores) were compared by ANOVAs test . The ratio of male and females were 2:1

OBSERVATION AND RESULTS

Table-1–Study of different grades of shivering- group A (ketamine) 24-were grade-, 2= grade-I, 4=grade-III, 0= grade-IV, Group B(clonidine) had 29-grade 0, 0=grade-I, 1=grade-II, 2= grade-III, o=grade-IV, Group-C (Tramadol) -28=grade-0, 0=grade-I, 1=grade-II, 3= grade-IV 0= grade-IV ANOVAs test, F=stat=(degree of freedom)=0.04 P>0.95(Insignificant) Table-2–Study of sedation score in all three groups – Group A(Ketamine) 4=grade-I, 7= grade-IV, 18= grade-III, 3=grade IV.Group B(clonidine) Group16=grade-I, 10=grade-II, 5=grade-III, 1= grade-IV. Group C(Tramodol)- 19= grade-I, 9=grade-II, 4= grade-III,0= grade-IV, ANOVAs test- had, F= stat(DF)=0.114(P>0.89)were Insignificant value. Table-3- The demographical indication, group A has significantly maintained the hemodynamic (Blood pressure and heart rate) and did not allow hypotension as compared to group B and C.

Table 1 :(No of patients 96) Study of different grades of shivering in all three groups

Shivering grade	Group A 32 (Ketamine)	Group B 32 (clonidine)	Group C 32 (Tramodol)	P value	F= Stat value
Grade-0	24	29	28	0.95	0.04
Grade-I	2	0	0		
Grade-II	2	1	1		
Grade-III	4	2	3		
Grade-IV	0	0	0		

Anova= Degree of freedom-0.04, P>0.95 test (insignificant)

Table 2: (No of patients 96)Study of Sedation Score in different groups

Sedation Score	Group A (32)	Group B (32)	Group C (32)	P value	F= Stat value
Grade-I	4	16	19	0.89	0.114
Grade-II	7	10	09		
Grade-III	18	05	04		
Grade-IV	03	01	00		

Anova test= Degree of freedom-0.114 P>0.89 test (insignificant)

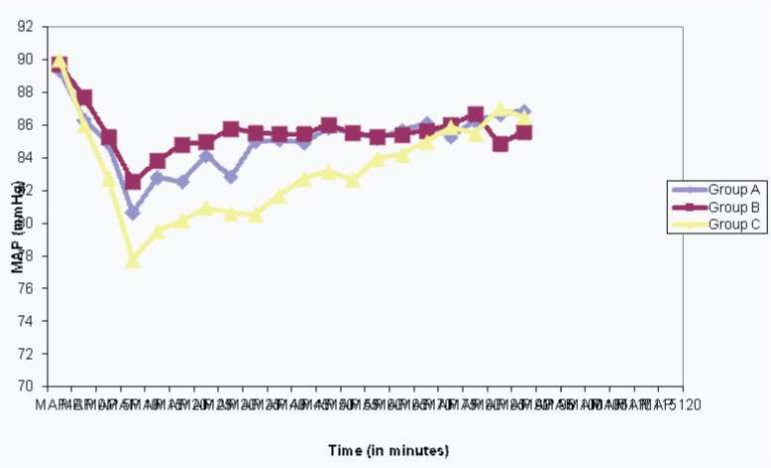

Figure 1: (No of patients 96) Trends in Blood pressure in three groups

DISCUSSION

In the present comparative of double-blind prophylactic ketamine,clonidineand tramodol for the control for the shivering in neuraxial anesthesia. In the study of different grades of shivering in all three groups. group A (ketamine) 24-were grade-0, 2= grade-I, 2= grade-II, 4=grade-III. Ingroup B (clonidine) had 29-grade 0, 0=grade-I, 2=grade-II. In Group-C (Tramadol) 28=grade-0, 0=grade-I, 1=grade-II, 3= grade-III 0= grade-IV .Anova test, F=stat=(degree of freedom)=0.04 P>0.95(Insignificant)(Table-1). In the study of sedation score in all three groups – Group A (Ketamine) 4=grade-I, 7= grade-II, 18= grade-III, 3=grade IV. Group B (clonidine) Group-16=grade-I, 10=grade-II, 5=grade-III, 1= grade-IV, Group C (Tramodol)- 19= grade-I, 9=grade-II, 4= grade-III,0= grade-IV, ANOVAs test- had, F=stat(DF)=0.114(P>0.89) Insignificant value.(Table-2). The demographic profile of hemodynamic parameters (heart rate and mean blood pressure) were compared in all three groups. Ketamine had higher heart rate and mean blood pressure as compared to remaining group (Table-3). These findings were more or less in agreement with previous studies[5,6,7]. Regional anesthesia, either central neuraxial block or peripheral nerve block is a safe and very popular technique used for various surgeries. However 40% to 60% patients develop shivering 8. Clonidine is a centrally acting selective α-2 agonist. Clonidine exerts its anti-shivering effects at three levels; hypothalamus, locus coerules and spinal cord. At the hypothalamic level it decreases thermoregulatory thresholdfor vasoconstriction and shivering, because hypothalamus has high density ofα-2 adenoreceptors and hence is effective in treating the established post anesthetic shivering[9]. It also reduces spontaneous firing in locus coeruleus- a pro-shivering centre in the pons[10]. At the level of spinal cord it activates the α-2 adrenorecptors and releases dynorphinenorepinephrine and acetylcholine. The depressor effects of these neurotransmitters at the dorsal horn modulate cutaneous, thermal inputs[11]. Moreover clonidine is highly lipid soluble easily crosses the blood brain barrier. Tramodol is an opiod analgesic with opoid action preferably mediated via μ(mu) receptors with minimal effect on kappa and delta binding sites. Tramadol also activates mononergic receptors of the descending neuraxial inhibiting pain pathway. The anti-shivering action of tramadol is probably mediated via its opiod or serotogenergic and noradrenergic activity or both. Ketamine is a competitive receptor antagonist NMDA (N-methyl-D aspirate) which has role in thermo regulation at various levels. It increases blood pressures, heart-rate and cardiac output because of direct sympathetic stimulation and inhibition of norephinephrine up take into post- ganglion sympathetic nerve endings and may decrease core to peripheral redistribution of heat[13]. Ketamine may cause, side effects such as confusion or hallucination. In the present study it was observed that, tramodol had potential to cause nausea and vomiting clonidine is known to cause hypotension and

bradycardia, but none of the patients complained severity of side effect. In the present study ketamine had significant role in sedation degrees as compared to other groups and maintained cardio-respiratory stability and prevented recall of un-pleasant events in the surgery[14]

SUMMARY AND CONCLUSION

The present comparative study of all three groups received different anesthetic drugs had significant prophylactic effect for the control of shivering. Moreover group A(Ketamine) had maintained hemodynamic stability and prolong sedation as compared to other 2 groups. While administration one has to bear in the mind the side effects of respective drugs such as ketamine causes hallucinations, tramadol causes nausea and vomiting and clonidine is known for hypotension. But this prophylactic study demands further genetic, nutritional, patho-physiological, neurotransmitters, pharmacological study because the exact mechanism which leads to shivering after neuraxial anesthesia is still un-clear.

REFERENCES

1. De whitle, sessler DI- Perioperative shivering physiology and pharmacology, Anesthesiology, 2002,96,467-84
2. Sessler D I, Ponte J- Shivering during epidural anesthesia. Anesthesiology, 1990,72,816-21
3. Katyal S, Tewari, A- shivering Anesthetic considerations, J. Anaesth. Clin, Pharm,2002,18,363-76
4. SesslerDaniel I- Temperature in Millar RD 8th edition, Textbook of Anastasia, Churchill living stone Inc. New York 2018,1367-89
5. Wilson E, David A – Sedation during spinal anesthesia comparison of profol and midazolam. Br. J. Anaesth, 1990,64,48-52
6. Imire MM, Hall GM- Body temperature and anesthesia. Br.J Anaesth 1990,64,346-54
7. Pascal A- Postanesthetic shivering Epidemiology, patho-physiology and approaches to prevention and management Drugs-2001,61,2193-205
8. Kim MS, Kim DW- Effect of ramosetron on shivering during neuraxial anesthesia, Korean. J anesthesia 2010,58,256-9
9. Delaunay L, Bonnet F, Liu, N- Post operative shivering in humans. Anesthesiology, 1993,79,470-4
10. Joris J, Banache M- Clonidine and Ketanserin both are effective treatment for post anesthetic shivering. Anesthesiology, 1993,79,532-9
11. Powell R M, Buggy D J- Ondansetron given before induction of anesthesia reduces shivering after general anesthesia, anaesth, Analg. 2000.90,1423-7
12. Alojado M E, Ohta Y- The effects of clonidine on the activity of neurons in the rats dorsal raphe nucleus in vitro. Aesth. Analg, 1994,79,257-60
13. Ikeda T, Kazama T- Induction of anesthesia with Ketamine reduces the magnitude of redistribution hypothermia, Anesth. Analg. 2001, 93, 934-8
14. Nashiyama. T Yokoyma T- Sedation guidelines for midazolam infusion during combined spinal and epidural anesthesia. J.Clin Anaesth, 2004,16,568-72

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