



Int. J. New. Chem., 2022, Vol. 9, Issue 3, pp 446-453.

International Journal of New Chemistry

Published online in <http://www.ijnc.ir/>

Open Access

Print ISSN: 2645-7237

Online ISSN: 2383-188x



Original Research Article

Comparison of the Efficacy and Rate of Ondansetron with Meperidine in the Treatment of Shivering after General Anesthesia after Heart Surgery

Hassan Mohammadi pour Anvari¹, Sahar Sadeghi^{2*}

¹Associate Professor of Anesthesiology, Tuberculosis and Lung Disease Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

² Anesthesiologist, Tuberculosis and Lung Disease Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

Received: 2021-12-16

Accepted: 2022-01-10

Published: 2020-01-20

ABSTRACT

Introduction: Shivering after anesthesia in cardiovascular surgery can be very dangerous and increase the need for oxygen and ultimately lead to damage to heart tissue; Therefore, treatment measures must be taken very quickly. The aim of this study was to compare the efficacy and rate of ondansetron with meperidine in the treatment of shivering after general anesthesia after heart surgery. **Material and Methods:** Shivering after anesthesia in cardiovascular surgery can be very dangerous and increase the need for oxygen and ultimately lead to damage to heart tissue; Therefore, treatment measures must be taken very quickly. The aim of this study was to compare the efficacy and rate of ondansetron with meperidine in the treatment of shivering after general anesthesia after heart surgery. **Results:** There was no significant difference between the two groups in the mean shivering in the two groups before the initial treatment [warm-up] and after warm-up and at different minutes after drug injection up to 9 minutes, and in the last minute Pvalue was equal to 0.05 **Conclusion:** Although ondansetron is effective in treating shivering after general anesthesia, it is less potent and faster than meperidine.

Keywords: Ondansetron, Shivering, Meperidine, Heart Surgery

Introduction

Postoperative shivering is usually but not always associated with hypothermia. Although thermoregulatory mechanisms have been described in the development of shivering in a hypothermic patient, different causes have been suggested for the explanation of shivering in the patient. One of the proposed mechanisms is based on the observation that the brain and spinal cord do not recover from general anesthesia at the same time. The view that doxapram, a CNS stimulant, is somewhat effective in relieving postoperative shivering, supports this theory. Other suggested mechanisms are: NMDA, Kappa opioid and 5-hydroxy tryptamine receptor activity [1, 2]. Regulation of shivering threshold and vasoconstriction is mediated by mechanisms such as norepinephrine, dopamine, acetylcholine, prostaglandin E1, and 5-hydroxytryptamine; Therefore, it seems that drugs that act on these mediators can also be effective in controlling shivering [2]. The most important effect of ondansetron as a serotonin receptor antagonist is the antiemetic effect, which is exerted by acting on the vagus nerve endings and their central receptors, thus preventing nausea and vomiting by centrally inhibiting the vomiting reflex. Its most important uses are in the treatment and prophylaxis of nausea after surgery and in patients with advanced cancer undergoing chemotherapy [3]. The effect of ondansetron on the prevention of shivering has also been studied in various studies. Administration of ondansetron and saline as a placebo before induction of anesthesia in patients undergoing orthopedic, urological and general surgeries showed a decrease in the incidence of shivering after anesthesia in the ondansetron group; Also, no difference between 8 mg of ondansetron and pethidine was reported in the prevention of shivering after anesthesia in patients undergoing spinal anesthesia. Ondansetron has no role in altering the threshold for shivering [4], sweating, and vasoconstriction in voluntary awake patients and has not caused hypothermia. The aim of this study was to evaluate the effect of ondansetron as an inhibitor of 5-hydroxytryptamine for the treatment of shivering and to compare the extent and speed of its effect with the current drug for the treatment of this complication, namely pethidine.

Material and Methods

This research was performed in the recovery room of Shahid Madani Hospital affiliated to Tabriz University of Medical Sciences in Tabriz. During this study, patients with shivering after general

anesthesia for laparotomy under ASA I, II, age 20 to 60 years, duration of surgery between 2 to 3 hours, no history of liver disease, heart, drug allergy, no prohibition of pethidine use [history of disease Pulmonary, seizures, drug allergies, use of MAOIs TCAs, increased ICP, severe kidney disease, hypothyroidism] and non-drug addiction were included in the study. In all cases, the temperature of the operating rooms was kept in the range of 22 to 24 and in case of discrepancy, no intervention was performed. The scale measured for shivering was based on the following scoring: Zero score: no shivering 1: peripheral cyanosis or peripheral vasoconstriction; 2: Shivering and clear movement in a muscle group; 3: Shivering and obvious vibrating movements in more than one muscle group; 4: Complete and severe vibration throughout the body. Patients who met the inclusion criteria were covered with a blanket for 3 minutes after determining the initial shivering score in recovery, and their body temperature increased by warming the skin surface with a warm touch device. In case of failure to control shivering and score more than 2 after warming, patients were injected with 25 mg of pethidine and 8 mg of ondansetron using the random forms method and with the approval of the anesthesiologist who performed the project. He did not know the type of drug injected, he recorded the shivering score every minute to 10 minutes. After 10 minutes, in case of no improvement in group 1, 25 mg of pethidine was used and in group 2, a supplemental dose of pethidine of 15 mg was used. Finally, the time of zero shivering score and the average shivering score in each group were compared at different minutes. This research was explained in simple language to all participants; Participation in the study was completely optional; The code of ethics was obtained from Tabriz University of Medical Sciences and after that the necessary studies were performed. The recorded information was analyzed by SPSS software. Mean and standard deviation or frequency and percentage were used to evaluate the preliminary results. T-test and Chi-square test were used to evaluate the results of the two groups.

Results

At the end of the study and after excluding specific cases, 27 patients in the meperidine group and 29 patients in the ondansetron group were analyzed. There was no statistically significant difference between the two groups in mean age, sex, anesthesia class [ASA] and fluid intake during anesthesia [Table 1].

Table 1: Comparison of demographic results in study participants

Variable		Meperidine group[N=27]	Ondansetron group[N=29]	P Value
Sex	Male	10	11	0.259
	Female	17	18	
Age		51.48±4.41	50.95±4.65	0.559
ASA	I	19	23	0.569
	II	8	6	

The mean shivering in the two groups before the initial treatment [warm-up] and after warm-up and at different minutes after drug injection up to 9 minutes, and in the last minute Pvalue was equal to 0.05. The mean number of minutes of zero shivering score in all patients who were completely cured before the tenth minute in the two groups was 7 minutes and earlier in the meperidine group than in the ondansetron group and was significantly different. The curve shown, the comparison between the mean shivering score between the two groups confirms the better speed of action of meperidine in treatment.

Table 2: Comparison of shearing rate before and after initial treatment

Variable	Meperidine group[N=27]	Ondansetron group[N=29]	P Value
before initial treatment	2.87±0.55	2.82±0.59	0.889
after initial treatment	2.45±0.37	2.40±0.36	0.875

Table 3: Comparison of shivering at different minutes after drug injection

Variable	Meperidine group[N=27]	Ondansetron group[N=29]	P Value
First	2.89±0.14	2.95±0.23	0.589
Second	2.74±0.41	2.88±0.12	0.458
Third	2.51±0.59	2.65±0.78	0.596
Fourth	2.36±0.96	2.42±0.45	0.665
Fifth	1.64±0.75	1.80±0.69	0.415
Sixth	1.33±0.32	1.56±0.36	0.557

Seventh	1.15±0.85	1.36±0.58	0.656
Eighth	1.01±0.97	1.18±0.25	0.499
Ninth	0.95±0.45	0.99±0.47	0.658
ninth	0.77±0.45	0.86±0.14	0.789

Discussion

The results of this study showed that although ondansetron is effective in treating shivering after anesthesia, the speed and power of treating shivering with meperidine is much better. The use of drugs in the class of 5-hydroxytryptamine receptor antagonists for the prevention and treatment of nausea and vomiting has been confirmed and has been used in various studies over the last two decades to prevent shivering after anesthesia and surgery. Its possible mechanism is the central regulation of the shivering threshold and its effect on vasoconstriction and dilation mediated by other catecholamines [5 , 6]. Most studies in this field have used drugs in this category to prevent the occurrence of shivering after anesthesia and have compared them with other commonly used drugs and have achieved completely different results [7, 8]. In a study, dolastron and clonidine were used before general anesthesia in patients undergoing abdominal surgery and urology and found that clonidine was effective, but dolastron at 12.5 mg was not as effective as ondansetron at 8 mg. Used in Powell's study, which was injected before anesthesia in similar patients, was effective in reducing the prevalence of shivering after anesthesia and was significantly more successful than the 4 mg dose of the same drug and placebo; These drugs have also been evaluated for postoperative shivering before regional anesthesia and have given relatively good results. Many studies have compared ondansetron with meperidine and saline, and both drugs have been shown to reduce shivering after spinal anesthesia as well as maintain central body temperature; While granistrone compared to ketamine has not been successful in controlling shivering after spinal anesthesia in urological patients, ondansetron has not reduced the severity and prevalence of shivering after cesarean section under female epidural spinal anesthesia [9 , 10]. Another success and useful use of this class of drugs in preventing shivering has been the administration of ondansetron before general anesthesia in gynecological surgeries by researchers [9]. Other studies that have used ondansetron to prevent shivering and have

shown positive effects include studies by Lane et al. On the prevalence of shivering after pediatric anesthesia, researchers on shivering after spinal anesthesia during cesarean section, and Other researchers compared ketamine, all of which have been shown to be successful in preventing shivering. The other drug in this class [5-hydroxytryptamine antagonist], Gransterone, did not differ from meperidine in the effect of preventing shivering after general anesthesia in laparoscopic surgery and was equally effective [10]. In our search for sources, only two studies of the use of ondansetron in the treatment of shivering after anesthesia found that ondansetron at a dose of 8 mg instead of 4 mg of meperidine was as effective in controlling shivering. In that study, the measurement of central and ambient temperature of the patient during surgery was omitted and the measurement of ambient temperature in recovery did not show a difference between the two groups, but the prescribed dose of ondansetron was a key point for effectiveness. The shivering of 100% of patients treated with butorphanol and 92.3% of patients treated with tramadol was controlled after 5 minutes, while in the ondansetron group only 23.5% in the first 10 minutes and less than 30% within the period Twenty minutes after drug injection, the shivering reached a zero score, and the results were significantly different from the time of ondansetron's effect on shivering control in our study. The inability to control shivering as well as shivering prevention was higher in studies on patients undergoing spinal anesthesia, and may be due to differences between the results of the present study, the type of anesthesia and severe changes in systemic vascular resistance, and a marked drop in central temperature. Due to limitations, they have not been measured or reported in most studies.

Conclusion

Although ondansetron is effective in treating shivering after general anesthesia, it is less potent and faster than meperidine. The important and positive point of most previous studies in the field of shivering prevention is the use of central temperature monitoring and its recording during surgery, which has been absolutely necessary due to the type of study and the time of drug injection. Injection of drug before anesthesia and its effect on postoperative shivering requires providing completely the same conditions in patients in terms of factors affecting body temperature, including ambient temperature and temperature of injected fluids and central temperature control to increase the prevalence and severity of postoperative shivering. The action does not cause unusual intervention. In our study, the severity of shivering was evaluated

regardless of ambient temperature and fluids, type of operation and length of operation, and only according to the severity of shivering and the initial recorded score. Done; Therefore, the need for temperature monitoring during surgery is eliminated; In addition, monitoring the patient's surface temperature does not help and determine the likelihood of postoperative shivering. More rapid meperidine in the treatment of shivering and earlier reduction of the shivering score to zero proved that ondansetron is a weaker drug than meperidine in the treatment of shivering after anesthesia and that most patients require additional treatment. The most important limitation of this study was the impossibility of recording the central temperature of patients, which was ignored due to the incidence and prevalence of shivering after anesthesia and the need for a large number of patients to reach a sufficient sample size and lack of equipment to the required number. And the study was performed only in cases of shivering with emphasis on the control of balloon symptoms. In the end, it is suggested that this study be performed by accurately recording the central body temperature [during surgery and during shivering in recovery] in a much larger number of patients so that in case of shivering and need treatment with recommended drugs, more attention to the absolute effect of the drug In the treatment of shivering after anesthesia.

References

1. C. Li, J.H. Yum, S.J. Moon, A. Herrmann, F. Eickemeyer, N.G. Pschirer, P. Erk, J. Schöneboom, K. Müllen and M. Grätzel, *ChemSusChem*, 1, 615. [2008].
2. J.-H. Yum, P. Walter, S. Huber, D. Rentsch, T. Geiger, F. Nüesch, F. De Angelis, M. Grätzel and M.K. Nazeeruddin, *J. Am. Chem. Soc.*, 129, 10320. [2007].
3. J.J. Cid, M. García-Iglesias, J.H. Yum, A. Forneli, J. Albero, E. Martínez-Ferrero, P. Vázquez, M. Grätzel, M.K. Nazeeruddin and E. Palomares, *Chem. Eur. J.*, 15, 5130. [2009].
4. A. Yella, H.-W. Lee, H.N. Tsao, C. Yi, A.K. Chandiran, M.K. Nazeeruddin, E.W.-G. Diau, C.-Y. Yeh, S.M. Zakeeruddin and M. Grätzel, *science*, 334, 629. [2011].
5. S. Mathew, A. Yella, P. Gao, R. Humphry-Baker, B.F. Curchod, N. Ashari-Astani, I. Tavernelli, U. Rothlisberger, M.K. Nazeeruddin and M. Grätzel, *Nature chemistry*, 6, 242. [2014].

6. S.J. Lind, K.C. Gordon, S. Gambhir and D.L. Officer, *Physical Chemistry Chemical Physics*, 11, 5598. [2009].
7. X. Lu, L. Feng, T. Akasaka and S. Nagase, *Chemical Society Reviews*, 41, 7723. [2012]; bM.N. Chaur, F. Melin, A.L. Ortiz and L. Echegoyen, *Angewandte Chemie International Edition*, 48, 7514. [2009]; cD. Bethune, R. Johnson, J. Salem, M. De Vries and C. Yannoni, *Nature*, 366, 123. [1993]; dT. Hirata, R. Hatakeyama, T. Mieno and N. Sato, *Journal of Vacuum Science & Technology A: Vacuum, Surfaces, and Films*, 14, 615. [1996].
8. J. Cioslowski and E.D. Fleischmann, *The Journal of chemical physics*, 94, 3730. [1991].
9. M. Pavanello, A.F. Jalbout, B. Trzaskowski and L. Adamowicz, *Chemical physics letters*, 442, 339. [2007]; bH. Malani and D. Zhang, *The Journal of Physical Chemistry A*, 117, 3521. [2013].
10. C. Fonseca Guerra, J.W. Handgraaf, E.J. Baerends and F.M. Bickelhaupt, *Journal of computational chemistry*, 25, 189. [2004].

How to Cite This Article

Sahar Sadeghi, Hassan Mohammadipour Anvari, “**Comparison of the efficacy and rate of ondansetron with meperidine in the treatment of shivering after general anesthesia after heart surgery**” *International Journal of New Chemistry.*, 2022; DOI: 10.22034/ijnc.2022.3.11.