

Effect of Buprinorphine and Granisetron in Post Anaesthetic Shivering Following General Anaesthesia-A Comparative Study

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Abstract : Shivering is seen in the immediate postoperative period due to the effect of medications that may cause vasodilatation; cold intravenous fluids that can cause drop in temperature and due to air conditioning in the operation theatre. The temperature should be optimal in the operating room, fluids to be warm to prevent shivering. Opioids can be used to prevent shivering along with the above precautions. In our study we are comparing effect of Buprinorphine and Granisetron to prevent shivering in the postoperative period.

Keywords: Buprinorphine, Granisetron, Shivering

I. Introduction

Post anaesthetic shivering is one of the most frequent problems in the early recovery phase following general anaesthesia [1,2]. Postanaesthetic shivering is not only distressing to patients, but can lead to physiological changes such as increased tissue oxygen consumption and carbon dioxide production, resulting in raised minute ventilation and cardiac output [3].

With elderly patients with limited cardiopulmonary reserve, they may suffer from lactic acidosis, mixed venous oxygen desaturation, and hypoxemia [4,5]. Opioids are widely used for anesthesia and pain control, they are also used for treatment of post-anesthetic shivering. Buprenorphine is an opioid with a similar structure to morphine but approximately 33 times more potent [6].

Serotonin (5-hydroxytryptamine [5-HT₃]), a biologic amine found in the brain and spinal cord, plays a part in neurotransmission; studies suggest that the serotonergic system plays a role in controlling perioperative shivering. A serotonin 5-HT₃ receptor antagonist inhibits the uptake of serotonin in the preoptic anterior hypothalamic region, which influences both heat production and heat loss [7]. Ondansetron, dolasetron, and granisetron, which are all 5-HT₃-receptor antagonists, have been used effectively to decrease postoperative shivering. The mechanism for 5-HT₃-receptor antagonists is still unclear but is thought to be related to inhibition of serotonin reuptake on the preoptic anterior hypothalamic region [8]. Buprenorphine is a μ receptor partial agonist, respiratory depression due to buprenorphine is less than morphine and buprenorphine also decreases the severity of shivering [6].

This study is comparison between buprinorphine 3 μ /kg and granisetron 40 μ /kg given 30 minutes prior to termination of anaesthesia in elective surgeries under general anaesthesia .

II. Materials And Methods Heading S

108 patients admitted for elective surgeries, done under general anaesthesia during the period of January 2016 to March 2016. Inclusion criteria was Patients belonging to ASA grade I and II; Age 18-60yrs; Weight- more than 45kgs; Height- more than 150cms. Exclusion criteria was Patient refusal.; Patients with known allergy to test drug.; Patients with opioid dependency; Patients with cardiopulmonary disease; Patients with psychiatric disorders.; Patients with body temperature less than 36.5 $^{\circ}$ c and more than 38 $^{\circ}$ c.

After obtaining informed consent, 108 patients were randomly divided into two groups of 54 each. Randomization done by computer generated table. Group B: Buprinorphine 3 μ /kg; Group G: Granisetron 40 μ /kg. All patients were examined a day before surgery. All were kept fasting overnight after 10:00pm and received tab. Rantidine 150mg orally and tab. Alprazolam 0.5mg orally as premedication at night before surgery and at 6:00am with sip of water in the morning on the day of surgery. All patients were preloaded with 5ml/kg ringer lactate solution after securing I V access with 18G cannula.

After the patient was brought to the operation theatre, the monitoring of pulse rate, blood pressure, ECG and SPO₂ was started. Preoxygenation with 100% oxygen, Premedication with inj Glycopyrrolate 0.2mg and inj Fentanyl 2 μ g/kg. Induction was done with inj Thiopentone 5mg/kg and inj Succinylcholine 1mg/kg, maintained with Isoflurane 1% , Vecuronium, oxygen & nitrous oxide. Intravenous fluids at room temperature

were administered. Heart rate , blood pressure and temperature were recorded.30 minutes before termination of anaesthesia, inj Buprinorphine 3µ/kg and inj Granisetron 40µ/kg were administered in group B and group G respectively.

Heart rate , blood pressure and temperature were recorded 15 minutes after drug administration, neuromuscular block reversed with Neostigmine and Glycopyrollate. Eventually when patient regained consciousness , the patient extubated and taken to recovery room. All patients were covered with blankets. In recovery room, the presence or absence of shivering was assessed using four point scale. Pain score for each patient calculated using VAS score.

Parameters observed were Heart rate , blood pressure and temperature before induction, 30 minutes prior and 15 minutes after administration of test drug; Presence or absence of shivering using four point score; Severity of pain using VAS score.; Hemodynamic status.; Side effects if any.

2.1 Shivering is graded according to four point scale:

- 1: no shivering.
- 2: mild shivering, slight facial and cervical muscle contraction.
- 3: moderate shivering, obvious shivering in head and neck, shoulders and/or extremities.
- 4: severe shivering, obvious shaking all over the body.

2.2 Quality of analgesia will be assessed by visual analogue scale(VAS).

Visual analogue scale for pain:

- 0 No pain
- 4-6 Moderate pain
- 7-10 Severe pain



Statistical analysis: Data was entered into Microsoft excel data sheet and was analyzed using SPSS 22 version software. Categorical data was represented in the form of Frequencies and proportions. Chi-square was used as test of significance. Continuous data was represented as mean and standard deviation. Independent t or Mann Whitney U test was used as test of significance to identify the mean difference between two groups. p value <0.05 was considered as statistically significant.

III. Results

Table 1: Age distribution of subjects between two groups

	Group				P value
	Buprenorphine		Granisetron		
	Mean	SD	Mean	SD	
Age	38.4	11.7	35.7	11.1	0.218

Mean age in Buprenorphine group was 38.4 ± 11.7 years and in Granisetron group was 35.7 ± 11.1 years. No significant difference was observed in mean age between two groups.

Table 2: Gender distribution of subjects between two groups

		Group				P value
		Buprenorphine		Granisetron		
		Count	%	Count	%	
Gender	Female	30	55.6%	26	48.1%	0.441
	Male	24	44.4%	28	51.9%	

No significant difference was observed in gender distribution between two groups.

Table 3: Anthropometric measurements of subjects between two groups

	Group				P value
	Buprenorphine		Granisetron		
	Mean	SD	Mean	SD	
Height	157.3	4.9	158.2	4.5	0.318
Weight	58.8	8.2	58.8	8.2	0.981

There was no significant difference in mean height and weight between two groups.

Table 4: Heart rate and MAP comparison between two groups

	Group				P value
	Buprenorphine		Granisetron		
	Mean	SD	Mean	SD	
Heart Rate	80.3	5.9	84.2	3.9	<0.001*
MAP	82.6	5.1	82.8	5.4	0.783

Mean HR was higher in Granisetron group than in Buprenorphine group significantly.

No significant difference was observed in MAP between two groups.

Table 5: Temperature comparison between two groups Pre op and post operatively

	Group				P value
	Buprenorphine		Granisetron		
	Mean	SD	Mean	SD	
Pre-Operative	36.7	0.3	36.6	0.3	0.048*
Post-Operative	36.0	0.2	35.6	0.2	<0.001*

Significant difference in mean temperature was observed between two groups at Pre-operative and post-operative period.

Table 6: Shivering score between two groups

		Group				P value
		Buprenorphine		Granisetron		
		Count	%	Count	%	
Shivering	0	46	86.8%	17	32.1%	<0.001*
	1	6	11.3%	25	47.2%	
	2	1	1.9%	11	20.8%	

In the study among subjects in Buprenorphine group, 86.8% of subjects had 0 score of shivering, were as only 32.1% had shivering score of Zero in Granisetron group. In Granisetron group majority of them had grade 1 shivering (47.2%) and 20.8% had Grade 2 shivering. This difference in shivering grade was statistically significant.

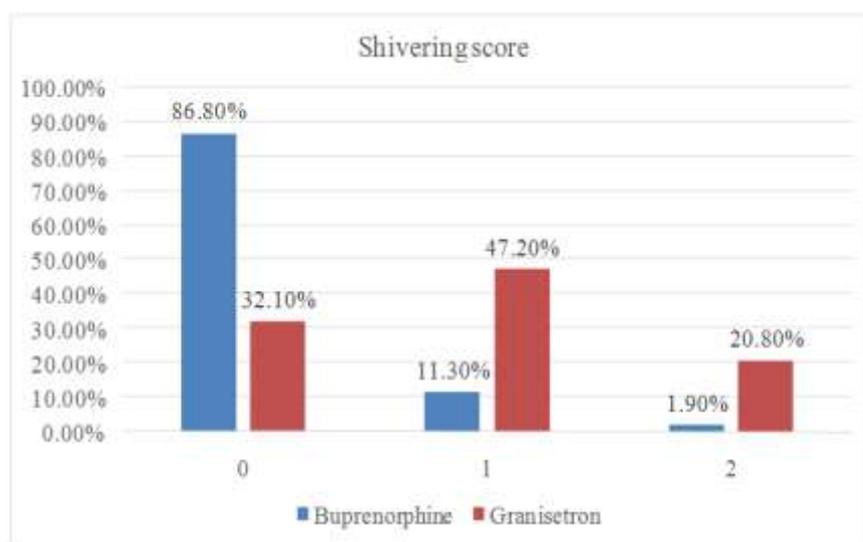


Figure 1: Bar diagram showing Shivering score between two groups

Table 7: Spo2 Comparison between two groups

	Group				P value
	Buprenorphine		Granisetron		
	Mean	SD	Mean	SD	
SpO2	99.1	0.8	99.1	0.8	0.904

No significant difference was observed between two groups with respect to Mean Spo2.

Table 8: VAS Score comparison between two groups

		Group				P value
		Buprenorphine		Granisetron		
		Count	%	Count	%	
VAS	1	5	9.4%	1	1.9%	<0.001*
	2	11	20.8%	2	3.8%	
	3	11	20.8%	4	7.5%	
	4	12	22.6%	11	20.8%	
	5	11	20.8%	13	24.5%	
	6	2	3.8%	17	32.1%	
	7	1	1.9%	5	9.4%	

In the study there was significant association between VAS score and drug administered. Lower VAS score was observed in Buprenorphine group than Granisetron group.

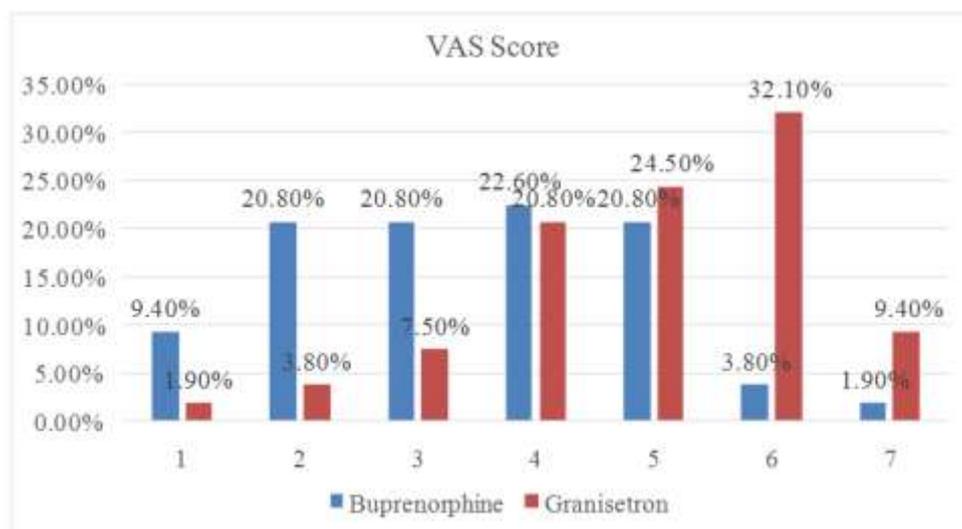


Figure 2: Bar diagram showing VAS Score comparison between two groups

Table 9: VAS Score median value between two groups

	Group						P value
	Buprenorphine			Granisetron			
	Mean	SD	Median	Mean	SD	Median	
VAS	3.4	1.5	3	5.0	1.4	5	<0.001*

Median VAS score in Buprenorphine group was 3, were as in Granisetron group Median VAS score was 5. This difference was statistically significant.

Table 10: Side effects among subjects

		Group				P value
		Buprenorphine		Granisetron		
		Count	%	Count	%	
Side Effects	Absent	50	92.6%	52	96.3%	0.338
	Hypotension	1	1.9%	2	3.7%	
	Nausea	2	3.7%	0	0.0%	
	Vomiting	1	1.9%	0	0.0%	

No significant difference was observed in complication rate between two groups.

IV. Discussion

Shivering is an unpleasant post-anesthetic complication if not treated it continues for minutes to hours. Prevention or treatment of post anesthetic shivering not only results in relief but also decreases the associated complications such as increased oxygen use and increased cardiac output which can be problematic especially in patients with heart problems . Therefore, treatment of shivering is as important as the pain relief. Opioids are widely used for anesthesia and pain control. They are also used for treatment of post-anesthetic shivering [6].

Parsa T et al. showed that 3µg/kg of Buprenorphine has analgesic and anti shivering property without any change in hemodynamic variables [6]. Iqbal A et al. showed that 40µg/kg of Granisetron has anti shivering effect without any adverse effects [8]. Mohammadi SS et al. showed that granisetron 3 mg intravenously is an effective method for prevention of spinal anesthesia induced shivering during cesarean section compared to saline control group. Nausea and vomiting were also reduced in this group of patients [9].

In our study demographic variables were not much significant. Mean HR was higher in Granisetron group(40µg/kg) [with Mean ±SD 84.2± 3.9] than in Buprenorphine group(3µg/kg) [with Mean ± SD 80.3 ±5.9] significantly. No significant difference was observed in MAP between two groups. Significant difference in mean temperature was observed between two groups at Pre-operative and post-operative period. Post operative temperature with Buprenorphine group [Mean ± SD 36.0± 0.2] is higher when compared to Granisetron group [Mean± SD 35.6± 0.2]

Parsa T et al. in their study compared the efficacy of buprenorphine and pethidine for prevention and treatment of post anaesthetic shivering . It showed that Thirteen out of thirty patients in buprenorphine group (43.3%) and five out of thirty patients in pethidine group (16.6%) had shivering [6].

Iqbal A et al. in their study compared granisetron and pethidine for prevention of post operative shivering which showed six out of thirty subjects developed grade 3 shivering in granisetron group whereas two out of thirty subjects developed grade 3 shivering in pethidine group [10].

In our study we observed that in Buprenorphine group, 86.8% of subjects had 0 score of shivering, were as only 32.1% had shivering score of Zero in Granisetron group. In Granisetron group majority of them had grade 1 shivering (47.2%) and 20.8% had Grade 2 shivering. This difference in shivering grade was statistically significant. . Lower VAS score was observed in Buprenorphine group than Granisetron group. Median VAS score in Buprenorphine group was 3, were as in Granisetron group Median VAS score was 5. This difference was statistically significant. No significant difference was observed in complication rate between two groups.

V. Conclusion

In our study we found that use of Buprenorphine (3µg/kg) had better control of postoperative shivering than Granisetron group (40µg/kg).

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