



“EFFICACY OF GRANISETRON ON PREVENTION OF SHIVERING IN LOWER ABDOMINAL SURGERIES UNDER SPINAL ANAESTHESIA”

Anaesthesiology

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ABSTRACT

Background: To study efficacy of granisetron on prevention of shivering in lower abdominal surgeries under spinal anaesthesia. Material and **Methods:** This is a prospective, randomized, interventional Study. Total sample size is 80. Patients who were undergoing lower abdominal surgeries under Spinal Anaesthesia were divided into two groups, 40 patients in each group. Group G: Inj. Granisetron 40ug/kg + Inj. NS 10ml IV 15 minutes prior to Spinal Anaesthesia. Group C: Inj. NS 10 ml IV 15 minutes prior to Spinal Anaesthesia. **Result:** Granisetron had better hemodynamic stability and had less incidence of nausea and vomiting than Group C. So, it can be used as a better alternative for shivering prophylaxis in patients undergoing surgeries under regional anaesthesia. **Conclusion:** Use of Granisetron is superior for control of post-operative shivering under spinal anaesthesia without any significant adverse effect.

KEYWORDS

Granisetron, Shivering, Spinal anaesthesia, Lower abdominal surgeries.

INTRODUCTION :

Shivering is one of the common complications of central neuraxial blockade. Shivering is defined as an involuntary, spontaneous, oscillatory mechanical activity of skeletal muscles associated with increased oxygen consumption(13). The main causes for shivering intraoperatively / postoperatively are temperature loss, decreased sympathetic tone, and systemic release of pyrogens [1]. Amongst the various causes shivering can be divided into two [2].

Thermoregulatory shivering occurs as a consequences of hypothermia, and in order to maintain normothermia, vasoconstriction and shivering occurs. Non-thermoregulatory shivering is less well understood and may be associated with postoperative pain, release of endogenous pyrogens, uninhibited spinal reflexes and adrenal suppression. Various pharmacological and non-pharmacological methods are available for control of shivering. Non-pharmacological preventing measures such as fluid warmers, maintaining ambient operating room temperature, space blankets, surgical drapes, active circulating warming mattress, and O₂ supplementation have been used. Pharmacological management includes various drugs [3] such as opioids [4] (Fentanyl (8), Pethidine, Pentazocine and Tramadol [5]), Benzodiazepines (Midazolam), Ketamine [7], α_2 agonists (Clonidine) [6] and non- opioids like 5-HT₃ receptor antagonists (Ondansetron (10) Palonosetron, Ramosetron, Granisetron (9)). Granisetron is a highly selective 5-HT₃ receptor antagonist which possesses Significant antiemetic activity, likely mediated through antagonism of 5-HT₃ Receptors on abdominal vagal afferents and possibly in or near the Chemoreceptor trigger zone (14). Recently, studies on serotonin (5-Hydroxytryptamine), a biological amine found in brain and spinal cord, which Has a role in neurotransmission and thermoregulation suggest that the Involvement of serotonergic system in the control of post anesthetic shivering. Serotonin antagonism seems to lower the human thermal set range thereby Reducing metabolic cold defenses and discomfort associated with postoperative hypothermia. We designed a study in our hospital for the prevention of post anaesthesia Shivering following spinal anaesthesia by prophylactic use of intravenous Injection of Granisetron (11,12) and Control with use of intravenous injection Normal Saline and compare the effectiveness of these two for the prevention of Postoperative shivering.

MATERIAL AND METHOD:

Written and Informed consent was obtained who would be scheduled

for lower abdominal Surgeries. Pre-operative evaluation was carried out a day before the Surgery. A thorough history was taken and examination was carried out in all patients. Patients were advised for routine and relevant investigations like CBC, renal And liver function tests, Random blood sugar, Chest X-Ray, 12 lead ECG and Reports were reviewed. Patients were kept nil per oral (NPO) for 6 hours before Surgery.

Preparation in OT:

The procedure was explained to the patient and taken inside the operation Theatre. All the minimum mandatory monitors, ECG, NIBP (noninvasive Blood pressure), pulse oximetry, skin temperature, end tidal CO₂ were applied, baseline hemodynamics were recorded (ECG, NIBP, RR, SpO₂, Temperature, Grades of Shivering). Securing an intravenous line with 18- or 20-gauge Intravenous cannula and an infusion of lactated ringers solution was started at a Rate of 10-20ml/kg before spinal anaesthesia. Patient had received oxygen 3litres/min by facemask throughout the procedure. **Group G:** Inj. Granisetron 40ug/kg + Inj. NS 10ml IV 15 minutes prior to Spinal Anaesthesia. **Group C:** Inj. NS 10 ml IV 15 minutes prior to parulgoyal4@gmail.com Anaesthesia.

Spinal Anaesthesia:

Under all aseptic and antiseptic precautions, subarachnoid block was given with inj. Bupivacaine 0.5% (heavy) 3 ml in the sitting position using a 23-gauge Quincke spinal needle positioned at the L3-L4 interspace. Patients were immediately turned to the supine position. Onset and level of sensory and motor block was recorded. Sensory level was checked with pin prick method and achieved between T8 to T10 segment and motor level by Bromage scale. Intra-operative Blood pressure, Heart rate, SpO₂, ECG, Respiratory rate, skin temperature and grades of shivering will be monitored till the completion of surgery.

Post procedure:

Haemodynamic data (Pulse, BP, RR, SPO₂, Skin Temp, Wrench Grade of Shivering) were recorded at 5 mins interval in the first 30mins and then every 15 mins until 4hrs.

The Shivering will be assessed by using four-point scale as **WRENCH ETAL POINT:**

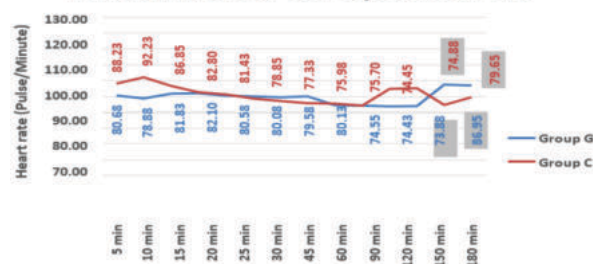
0. No Shivering.

1. Piloerection, peripheral vasoconstriction or peripheral cyanosis without visible muscle activity.
2. Visible muscular activity confined to one muscle group.
3. Visible muscular activity in more than one muscle group.
4. Gross muscular activity involving the entire body.

Also, recovery time from spinal anaesthesia, in terms of wearing off motor and sensory effects will be noted. The heart rate and systolic blood pressure will be measured and recorded at the above-mentioned intervals up to 4hrs. Patients had monitored to recognise shivering and any side effects during the post-operative period e.g. hypotension, bradycardia, vomiting etc. Tramadol was administered intravenously 2mg/kg to patients with shivering grade 3 or higher. Statistical analysis was performed with unpaired Student's t-test between two groups. P value<0.05 was considered significant.

RESULT:

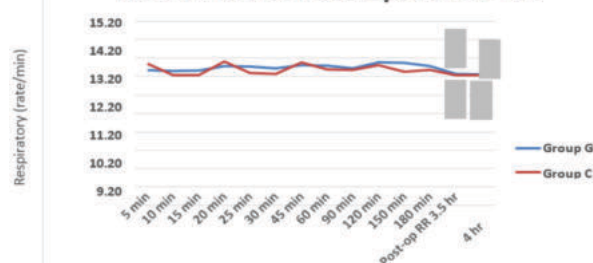
Mean Intra & Post Operative HR



Graph : Intra-op & Post-op Heart rate (Pulse/Minute)

Graph shows that in the Group G patients had mean heart rate ranging from 73.88 to 87.53 between Intra-op & post-op. Similarly, in the Group C patients had mean heart rate ranging from 74.45 and 92.23 between Intra-op & post-op. The association between the intervention groups and mean heart rate is considered to be not statistically significant since $p > 0.05$ as per 2 tail unpaired t test but there is statistically significant difference at 2.5 hrs, 3hrs, 3.5 hrs and 4 hrs (P value<0.05 in all).

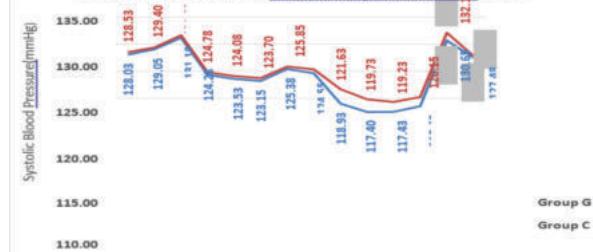
Mean Intra & Post Operative RR



Graph : Intra-op & Post-op Respirate rate (rate/min)

Graph shows that in the Group G patients had mean Respiratory Rate ranging from 12.33 to 12.98 between Intra-op & post-op. Similarly, in the Group C patients had mean Respiratory Rate ranging from 12.25 and 13.03 between Intra-op & post-op. The association between the intervention groups and Respiratory Rate is considered to be not statistically significant since $p > 0.05$ as per 2 tail unpaired t test.

Mean Intra & Post Operative SBP

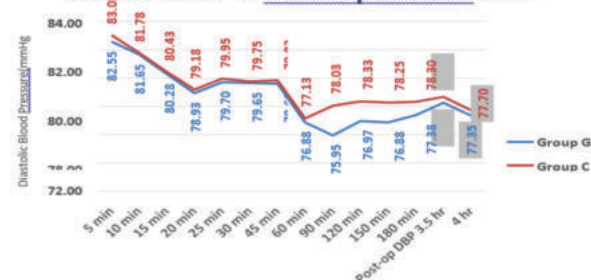


Graph: Intra-op & Post-op Systolic blood pressure(mmHg)

Graph shows that in the Group G patients had mean Systolic Blood Pressure ranging from 117.40 mmHg to 131.18 between Intra-op & post-op. Similarly, in the Group C patients had mean Systolic Blood Pressure ranging from 119.23 and 132.15 between Intra-op & post-op. The association between the intervention groups and Systolic Blood

Pressure is considered to be not statistically significant since $p > 0.05$ as per 2 tail unpaired t test.

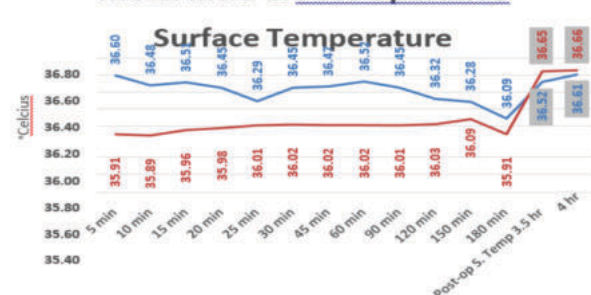
Mean Intra & Post Operative DBP



Graph : Intra-op & Post-op Diastolic blood pressure(mmHg)

Graph shows that in the Group G patients had mean Diastolic Blood Pressure ranging from 75.95 mmHg to 82.55 between Intra-op & post-op. Similarly, in the Group C patients had mean Diastolic Blood Pressure ranging from 77.13 and 83.03 between Intra-op & post-op. The association between the intervention groups and Diastolic Blood Pressure is considered to be not statistically significant since $p > 0.05$ as per 2 tail unpaired t test.

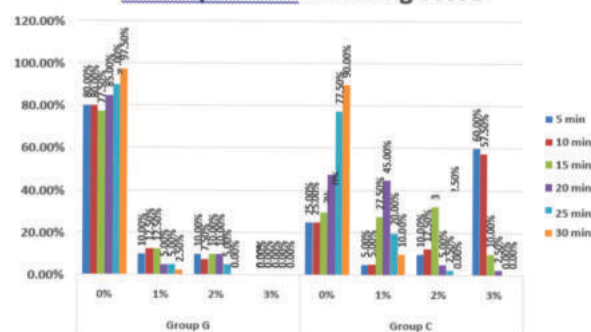
Mean Intra & Post Operative Surface Temperature



Graph : Intra-op & Post-op Surface Temperature(°Celsius)

Graph shows that in the Group G patients had mean Surface Temperature ranging from 36.09 °C to 36.61 °C between Intra-op & post-op. Similarly, in the Group C patients had mean Surface Temperature ranging from 35.91 °C and 36.66 °C between Intra-op & post-op. The association between the intervention groups and Surface Temperature is considered to be statistically significant since $p < 0.05$ as per 2 tail unpaired t test but there is no statistically significant difference at 4 hrs ($P > 0.05$).

Post Operative Shivering Score



Graph 16. Post-op Shivering Score

Graph shows that in the Group G patients had Shivering Score 65 In group G shivering score is ranging from 0 to 2 during post-op. Similarly, in the Group C patients had Shivering Score ranging from 0 to 3 during post-op. Shivering score of 0 is maximum 97.5% at 30 mins in Group G while that is 90% in Group C.

The association between the intervention groups and Shivering Score is considered to be statistically significant for 0 to 20 mins post-op for score 0 since $p < 0.05$ as per 2 tail unpaired t test. For score 1, it is insignificant from 0 to 15 mins ($p > 0.05$) but significant at 20 mins ($p < 0.05$). For score 2, it is insignificant from 0 to 10 mins and 20 mins ($p > 0.05$) but significant at 15 mins ($p < 0.05$).

DISCUSSION:

Shivering is the most common problem faced by an Anesthesiologist during intra operative and post operative periods. During the postoperative period it is a common and undesirable complication of regional anaesthesia. It is defined as readily detectable fasciculation of the face, jaw, head, trunk or extremities lasting longer than 15 seconds. A number of factors, including age, duration of surgery, temperature of the operating room, type of regional anesthesia (spinal or epidural), and infusion solution, are risk factors for hypothermia and shivering.

In regional anesthesia, the sympathetic nerve blocking leads the vasodilation in the blocked area. Furthermore, the vasocontraction threshold above the blocked area is decreased by 0.5°C. Due to that, the body heat transfers from the body core to the peripheral. This process causes heat production–heat loss imbalance and triggers hypothermia. Hypothermia because of neuraxial anesthesia occurs through three phases: redistribution, body heat loss to the environment and the inhibition of the temperature regulation center.

Many medications including non-opioid and opioid drugs are usually administered to prevent and subside post-operative shivering. 5-HT₃ receptor antagonists have recently been used to prevent post-operative shivering. Some potential side effects include decrease or increase in blood pressure, respiratory system depression, nausea and vomiting, and sedation.

Granisetron is a highly selective 5-HT₃ receptor antagonist which acts by inhibition of serotonin reuptake on the preoptic anterior hypothalamic region. 5-HT₃ is released from the preoptic area of the hypothalamus and increases the body temperature by initiating heat production pathways. Preventing 5-HT reuptake in the preoptic area is the possible cause of decrease in postoperative shivering by 5-HT₃ antagonists after general or spinal anesthesia. Hence, this study was undertaken to evaluate the effectiveness of Granisetron in the prevention of post operative shivering in patients undergoing elective lower abdominal surgeries under spinal anesthesia. In the two groups, the recorded values were tabulated for Age, Gender, Weight, Height, Heart rate, Systolic blood pressure, Diastolic blood pressure, Surface temperature and Shivering score post operatively. The result of the study was compared with the observation of other workers in the field of work taking into account for the differences as far as possible.

CONCLUSION:

This study was designed to evaluate the efficacy of Granisetron (a 5-HT₃ receptor antagonist) on the Spinal Anaesthesia induced shivering during lower abdominal surgeries. We concluded that Granisetron is effective in the prevention of post spinal shivering in lower abdominal surgeries. Granisetron had better hemodynamic stability and had less incidence of nausea and vomiting than Group C. So, it can be used as a better alternative for shivering prophylaxis in patients undergoing surgeries under regional anaesthesia.

Thus, use of Granisetron is superior for control of post-operative shivering under spinal anaesthesia without any significant adverse effect.

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