

Comparison of dose requirement of propofol with and without bispectral monitoring in patients undergoing spinal epidural anaesthesia: An institutional based study

Ratan Pal Singh¹, Megha Arora^{2,*}

¹Associate Professor, ²Assistant Professor, Dept. of Anaesthesia, Rajshree Medical Research Institute & Hospital, Bareilly, Uttar Pradesh, India

*Corresponding Author: Megha Arora

Email: dr.meghaarora@gmail.com

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Abstract

Introduction: Sedative protocols are a topic of current research, especially for establishment of extensive monitoring systems for sedative agents. Bispectral index (BIS) is one of the main indicators for measuring the anaesthesia depth. Hence; present study was planned to comparatively assess the dose requirement of propofol with and without bispectral monitoring in patients scheduled to undergo spinal epidural anaesthesia.

Materials and Methods: We planned the present research to comparatively assess the dose requirement of propofol with and without bispectral monitoring in subjects scheduled to undergo spinal epidural anaesthesia. For the present study, we evaluated a total of 60 patients and broadly divided them into group 1 and group 2, based on the absence and presence of BIS monitoring respectively. We maintained and compiled the complete demographic, clinical and anaesthetic data of all the patients and analyzed the results by SPSS software.

Results: While comparing the average time needed for reaching the adequate level of sedation in between the two study groups, significant results were obtained. We also obtained significant results while comparing the average recovery time in between subjects of both the study groups.

Conclusion: For assessing the level of sedation in regional anaesthesia cases, BIS monitoring should be done.

Keywords: Bispectral monitoring, Propofol, Spinal anaesthesia.

Introduction

Anaesthesia depicts the perfect coordination between anaesthetics agent need and the state of arousal of the subject undergoing anaesthesia procedure. If any inadequacy exists in relation to the dose of the anaesthesia, there is increase in prevalence of awareness. Also hemodynamic instability, delayed recovery, along with incidence of other complications occur with generous administration of drugs.^{1,2}

In the recent era, there has been extensive investigation on the sedative protocol because of advancement in the monitoring systems of sedative drugs. Significant tolerance and speedy recovery has been found to be occur when intermittent propofol is used for sedation.³

Propofol is a preferred agent because of its capacity to preserve constant plasma concentration with non-stop infusion. Shorter induction time along with rapid redistribution is some of the other advantages offered by propofol. Required propofol dose is reduced by addition of opioids to it.⁴⁻⁶ Bispectral index (BIS) is one of the commonly employed indicator for assessing the depth of anaesthesia. Patients' electroencephalography (EEG) and electromyography (EMG) statistics are assessed by it. Data from the past shows positive association between propofol drug concentration, and BIS level.⁷⁻⁹

Under the light of above mentioned data, present study was planned to assess and compare the dose requirement of propofol with and without bispectral

monitoring in patients undergoing spinal epidural anaesthesia.

Materials and Methods

The present study was commenced in the Anaesthesia department of Rajshree Medical Research Institute & Hospital, Bareilly, Uttar Pradesh (India) and it included assessment of the dose requirement of propofol with and without bispectral monitoring in patients undergoing spinal epidural anaesthesia. Enrolment of 60 patients was done in the present study who underwent elective gynecological surgical procedure. This was followed by random division of patients into two study groups with 30 patients in each group as follows:

1. **Group 1:** Patients who received propofol infusion without BIS monitoring,
2. **Group 2:** Patients who received propofol infusion with BIS monitoring.

Exclusion Criteria

1. Patients with presence of any co-morbid condition.
2. Patients with positive history of drug allergic reactions.
3. Patients with presence of psychiatric disorder.
4. Patients with presence of neurological disorder.

Recording of complete clinical and biochemical details of all the subjects in the operating room was done. Complete data relation to the time of infusion, recovery and postoperative complications were maintained. SPSS software was used for assessing the

results with univariate regression curve and Mann Whitney U test for assessing the significance level.

Results

Broad division of 60 subjects was done in the present study into two study groups. Mean age of the subjects of group 1 was 40.5 years. Mean age of the subjects of the group 2 was 42.1 years. Average time required for reaching the sedation satisfaction level was 18.5 minutes in group 1 and 7.3 minutes in group 2. The results of this comparison were found to be statistically significant. 10.45 minutes was the mean recovery time observed in patients of group 2 while 5.42 minutes was the mean recovery time observed in patients of group 1, the results of which were found to be statistically significant. We didn't observe any significant difference while comparing the frequency of complications in between the two study groups.

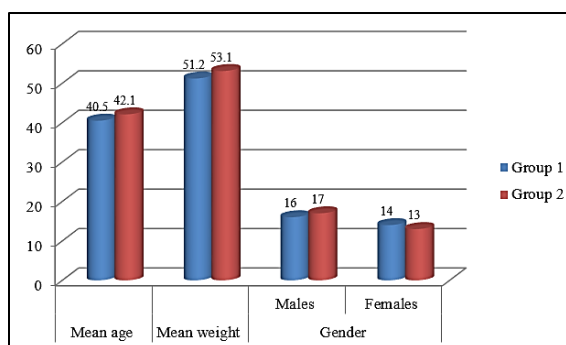


Fig. 1: Description of patients

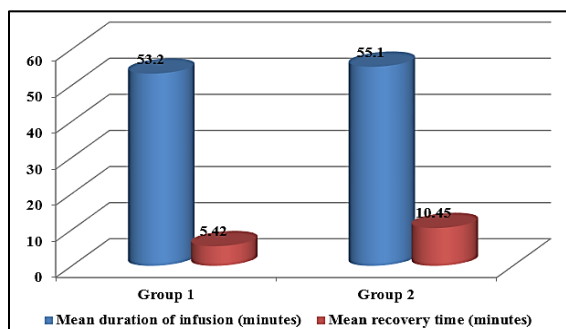


Fig. 2: Mean duration of infusion and recovery time among subjects of both the study groups

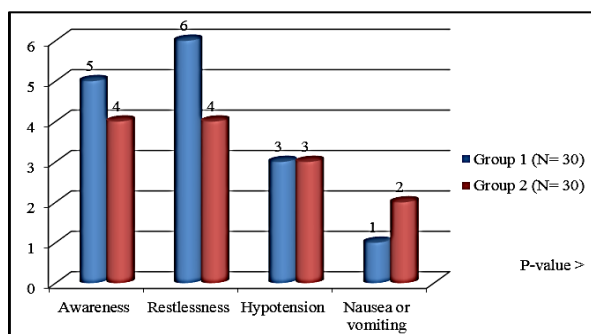


Fig. 3: Complications

Table 1: Comparison to time duration in between the two study groups

Parameter	Group 1	Group 2	P-value
Average Time needed for reaching adequate sedation level (mins)	18.5	7.3	0.02*

*:Significant

Table 2: Comparison of clinical parameters

Parameter	Group 1	Group 2	p-value
Mean infusion duration (minutes)	53.2	55.1	0.25
Mean recovery time (minutes)	5.42	10.45	0.01*

*: Significant

Discussion

In the present study, mean recovery time among subjects of group 1 and group 2 was 5.42 and 10.45 minutes respectively. In one of the past studies conducted by Bresil P et al, authors concluded that BIS monitoring for guidance of propofol-remifentanyl anaesthesia does not lead to reduction in consumption of anaesthetics, with no reduction of time to extubation in adult and paediatric subjects in comparison to the conventional practice.¹⁰ Assessment of BIS following propofol induction was done by Arya et al, on the dosage requirement of propofol along with its haemodynamic effects and BIS alterations. A total of 70 patients were assessed by them which were planned to undergo elective surgery under general anaesthesia. They randomly divided the patients into two study groups- group A and group B. Group A comprised of patients who were given (inj.) fentanyl (2 µg/kg), followed 3 min later by inj. propofol at the rate of 30 mg/kg/hr infusion to the point of loss of response to verbal command. Group B comprised of patients that inj. fentanyl (2 µg/kg), followed 3 min later by inj. propofol at the rate of 30 mg/kg/hr infusion. From the results, they concluded that in relation to the induction dose of propofol, no significant difference exists, when assessed clinically or through BIS monitoring.¹¹ In another study conducted by Lo YL et al, the authors didn't observe any significant difference in relation to the quantity of patients with hypotensive events.¹² Banerjee A et al, in one of the previous studies, recognized the impact of caudal epidural block on upkeep need of IV propofol in targeted BIS checked subjects. They initially administered general anaesthesia to children, followed by administration of caudal analgesia and IV analgesia, with the aim of monitoring the propofol infusion intra-surgical requirement. They did this by using BIS monitoring system. Total 82 children within the age group of three years to six years were evaluated by them, who were scheduled to undergo infra-umbilical surgery. They randomly made division of all the patients into two

broad groups; group A and group B with 41 patients in each group. By analysing the results, the authors came up to conclusion that a decline in the consumption of IV propofol occurred in BIS-monitored paediatric subjects.¹³

In the epidural space, mechanism of action of anaesthetic solution occurs by three prominent ways. First mechanism says that most crucial factor in the arousal from anaesthesia is played by pain factor. From the surgical site, blockage of pain occurs by caudal analgesia. This leads to a decline in the demand of general anaesthesia. Second mechanism says that reduction in the anaesthetic requirement occurs by neuraxial block. This occurs by suppression of the movement in reaction to toxic incitement under the level of sensory block. Third mechanism states that brain is directly affected by the rostral movement of the local anesthetic in CSF.¹⁴ In another study conducted by Agarwal A et al, authors assessed the impact of LA solutions on the balanced anaesthesia components. These components included hypnosis, analgesia, and muscle relaxation. The authors observed that during the phase of anaesthesia maintenance, there is significant decline in the need of vecuronium and fentanyl in the bupivacaine group. By analysis of the results, they concluded that during general anaesthesia administration, reduction in the need of propofol, fentanyl, and vecuronium infusion occurs in subjects in which epidural bupivacaine was administered prior to induction of anaesthesia reduces the requirement of propofol, fentanyl, and vecuronium during general anaesthesia.¹⁵ Results from previous studies also established that fact that by performing caudal blockage, there occurs a decline in the requirement of intraoperative inhalation anaesthetic like sevoflurane.¹²⁻¹⁶

Conclusion

From the above results, it can be concluded that BIS monitoring should be done for assessing the level of sedation in regional anaesthesia cases. This results in reduction in the total dose of propofol needed. However; further studies are recommended in future in this field for better exploration of this field of anaesthesia.

Conflict of Interest: None

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