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Original Research Article

Effects of preoperative gabapentin on postoperative relief of pain in patients scheduled for surgery under general anaesthesia

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ABSTRACT

Background: To evaluate the effects of preoperative Gabapentin on postoperative relief of pain in patients scheduled for surgery under general anaesthesia. Post-operative ward and OT Department of Anaesthesia, JAH, GR Medical College, Gwalior, Madhya Pradesh, India.
Methods: The sixty patients subjected to ASA grade I and II posted for elective surgeries under general anaesthesia were randomized into 2 groups. One and half hour before surgery, Gabapentin 600 mg and placebo was given blindly to selected patients for the study. The postoperative pain was assessed with visual analogue score. Pain and side effects assessment were performed.
Results: Total 60 patients of ASA grade I and II posted for elective surgeries under GA were randomized into 2 groups. One and half hour before surgery, the drug selected for the study was given blindly with a sip of water. The mean (±SD) of VAS score was 5.86±0.34 in Group B and 5.10±0.84 in Group A. VAS score was significantly lower in Group A. With oral Gabapentin time required for rescue analgesia is delayed as compared to control group. The mean (±SD) TRA-1 was 38.40±24.61 in Group B and 44.03±8.94 in Group A.
Conclusions: Preoperative oral Gabapentin significantly decreases the severity of pain postoperatively as compared to placebo in patients posted for surgery. Time for analgesic requirement is more with oral Gabapentin. The VAS score was lower in Gabapentin group.

Keywords: General anaesthesia, Gabapentin, Postoperative pain, Visual analogue score

INTRODUCTION

The most common and distressing symptom, which follows anaesthesia and surgery is pain.[1] Allodynia and hyperalgesia are the cardinal signs and symptoms of neuropathic pain are also present after trauma and surgery.[2] The aim of postoperative pain treatment was to minimize patient discomfort, facilitate early mobilization and functional recovery and prevent acute pain developing into chronic pain.[3] Three different classes of drugs are utilized in the postoperative pain management (anti-inflammatory, local anaesthetics, and opioids) but long term clinical use of these agents is limited by their side effects. Preoperative Gabapentin is a novel drug used for the treatment of postoperative pain with antiallodynic and antihyperalgesic properties.[4] Gabapentin is chemically 1-aminomethyl cyclohexane acetic acid, it provides analgesia by binding to the α2δ subunit of voltage-gated calcium channels, decreasing the release of glutamate, norepinephrine and substance P from presynaptic afferent neurons.[5] Gabapentin was used as an adjuvant anticonvulsant drug for the treatment of partial

seizures. It is also effective in treating chronic pain conditions, including post-herpetic neuralgia, diabetic neuropathy, complex regional pain syndrome, inflammatory pain, central pain, malignant pain, trigeminal neuralgia, HIV-related neuropathy and headaches.[6]

The aim of this study was to compare the effect of Gabapentin with the control group on the postoperative pain in patients scheduled for surgery under general anaesthesia.

METHODS

After Ethical committee approval and written informed consent this double-blind, randomized, prospective clinical study was carried out in 60 patients of ASA grade I or II of either sex, aged 18-50 years scheduled for elective surgeries under general anaesthesia JA Hospital, GR Medical College, Gwalior, Madhya Pradesh, India. Exclusion criteria included known allergy or sensitivity to the drug, psychiatric illness, history of neurological hepatic, renal, cardiovascular, respiratory diseases, hypertension, peptic ulcer diseases, diabetes mellitus, bleeding or clotting disorders. Menstruating, pregnant or lactating females were also excluded from this study. Sixty patients who fulfilled the eligibility criteria were chosen, explained about the procedure and written consent was taken. Patients were subsequently randomized into two groups of 30 each. Group B (n=30) received a placebo orally one and a half hours prior to surgery and Group A (n=30) received Gabapentin 600 mg orally one and a half hours prior to surgery. One and a half hours before surgery vital parameters including pulse rate, blood pressure (BP) and electrocardiography (ECG) of all the patients were recorded in pre-anaesthetic room and then the drug selected for the study was given with a sip of water.

Anaesthesia technique was standardized in all the groups. In the operative room, intravenous (IV) line was secured by using 18-gauge cannula and preoperative vitals (pulse, BP, respiratory rate, Sp02) were recorded. The patients were premedicate with inj. Glycopyrrolate 0.02 mg/kg I/M 30 minutes before surgery and Inj. Pentazocine 0.5 mg/kg IV on OT table. After pre-oxygenation for three minutes, anaesthesia was induced with inj. Thiopentone sodium 5 mg/kg IV and inj. Succinylcholine 1.5 mg/kg IV. Intubation was done with appropriate size endotracheal tube and anaesthesia was maintained on oxygen (33%), nitrous oxide (67%) along with intermittent doses of inj. Atracurium besylate 0.5 mg/kg body weight, initially followed by increments of 0.1 mg/kg body weight and halothane (0.75%) under controlled ventilation. After completion of the surgery, neuromuscular blockade was reversed with Inj. Glycopyrrolate 0.4 mg/kg + inj. Neostigmine 0.08mg/kg body weight IV and once adequate reversal was obtained the patient was shifted to postoperative ward for further monitoring. Postoperative pulse rate, blood pressure, respiratory rate and severity of pain on VAS scale was noted immediate postoperatively and then at 15, 30, 45, 60, 90, 120 and at 180 mins.

Assessment of postoperative pain

Postoperative pain was assessed using analogue score scale, which consisted of a 10 cm horizontal scale with gradations marked as ‘0’ means no pain at all and ‘10’ means unbearable pain inj. Tramadol 2 mg/kg body weight IV was given as rescue analgesic whenever the subject requests for analgesia.

Sedation score sedation was assessed on the basis of modified Ramsay sedation score.[7]

The occurrence of side effects such as nausea and vomiting, respiratory depression, dizziness, sedation, headache and shivering were recorded. All data were collected and analysed with the SPSS version 17.0 for Windows Statistical Software Package (SPSS Inc., Chicago, IL, USA). Quantitative data were analysed by student t-test. P-value <0.05 was considered statistically significant.

RESULTS

A total of 60 patients were recruited and studied. The two groups were comparable with respect to age, sex, weight and duration of surgery (Table 1).

Table 1: Baseline data of study group.

Characteristic	Group ‘B’	Group ‘A’
Age (years)	34.20 (±8.80)	37.53 (±9.31)
Sex (M:F)	10:20	14:16
Weight (kgs)	56.10 (±6.65)	59(±6.96)
Duration of procedure (Min)	105.83 (±45.45)	106.33 (±33.44)

Table 2: Statistical analysis of visual analogue score in two study groups.

Time (min)	Group-B (Mean±SD)	Group-A (Mean±SD)
POi	5.86±0.34	5.10±0.84
PO15	5.60±0.49	5.06±0.98
PO30	5.20±0.48	4.60±1.27
PO45	5.03±0.66	4.40±1.24
PO60	4.90±0.40	4.10±1.24
PO90	4.70±1.02	4.00±1.28
PO120	4.86±1.07	4.03±1.47
PO180	4.86±0.97	4.00±1.33

On hemodynamic parameters, there was no significant changes (P value) were present in pulse rate, systolic blood pressure, diastolic blood pressure and respiratory rate among two groups (P>0.05). The mean (±SD) of VAS score was 5.86±0.34 in Group B and 5.10±0.84 in

Group A. VAS score was highly significantly lower ($p<0.01$) in Group A as compared to Group B and this was a highly significant difference in Group A as compared to Group B at all points of observations (Table 2).

The mean (±SD) TRA-1 was 38.40±24.61 in Group B and 44.03±8.94 in Group A. TRA-I in group A was lower in highly significant values ($p<0.01$) as compared to group B at all points of observations (Table 3).

Table 3: Time requirement for rescue Analgesia - I.

TRA- l	Group-B	Group-A
Mean	38.40	44.03
±SD	24.61	8.94

In group B, none of the patients had sedation and in group A, 43.33% patients had sedation score 2. Thus, it was found that Gabapentin causes sedation (Table 4). None of the patients in both the groups had respiratory depression.

Table 4: Distribution of sedation score among two groups.

Sedation score	Group- B		Group-A	
	n	%	n	%
1	30	100	17	56.66
2	0	0	13	43.33
3	0	0	0	0
4	0	0	0	0
5	0	0	0	0
6	0	0	0	0

DISCUSSION

The findings of this study indicated that preoperative oral Gabapentin 600 mg significantly decreases the severity of pain postoperatively as compared to placebo in patients posted for surgery under general anaesthesia. Author also observed that time for analgesic requirement is more with oral Gabapentin. Author used Gabapentin in a dose of 600 mg, one and a half hours prior to surgery. The doses were chosen after careful consideration of the oral bioavailability of the drug as well as a few previous trials done on similar lines. In comparison to the control group, patients in the Gabapentin group had significantly lower VAS scores in all time intervals during the study period.

The mean (±SD) TRA-I was 38.40±24.61 in group B, and 44.03±8.94 in group A. With oral Gabapentin time required for rescue analgesia is delayed as compared to control group. Gabapentin is gamma-aminobutyric acid and it provides analgesia by binding to the α2δ subunit of voltage-gated calcium channels, decreasing the release of glutamate, norepinephrine and substance P from presynaptic afferent neurons and produces analgesia and their synergistic effect with opioid reduces the analgesic requirement. Pandey CK et al, also found that Gabapentin significantly decreases postoperative pain and rescue analgesic requirement in laparoscopic cholecystectomy.[8] Similar results were obtained from other studies.[9-13] Table 4 shows that in group C none of the patients had sedation, in group G, 43.33% patients had sedation score 2. Thus, it was found that Gabapentin causes sedation.

CONCLUSION

This clinical study demonstrated that preoperative oral Gabapentin 600 mg significantly decreases the severity of pain postoperatively as compared to placebo in patients posted for surgery under general anaesthesia. Time for analgesic requirement is more with oral Gabapentin. The VAS score was lower in Gabapentin group. Oral Gabapentin produces sedation than the placebo group.

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