



ORIGINAL RESEARCH PAPER

Anaesthesiology

A COMPARATIVE EVALUATION OF ORAL GABAPENTIN AND INTRAVENOUS CLONIDINE PREMEDICATION FOR POSTOPERATIVE ANALGESIA AND ANALGESIC REQUIREMENT FOLLOWING GENERAL ANESTHESIA FOR ABDOMINAL SURGERIES

KEY WORDS: General anesthesia, post-operative analgesia, abdominal surgeries, Visual analogue scale.

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ABSTRACT

Introduction : The aim of modern anesthesia is to ensure that patients have surgeries without pain, awake from anesthesia with excellent pain control and to maintain that throughout postoperative period. The major goal in the management of postoperative pain is minimizing the dose of medication, to lessen side effects while still providing adequate analgesia.

Aim : To compare the post-operative analgesic efficacy of oral Gabapentin and intravenous Clonidine premedication on patients undergoing abdominal surgeries.

Materials & methods : We have undertaken randomized, double blind study of 80 patients undergoing abdominal surgery under general anaesthesia. The study is randomized by closed envelope method. In this 80 envelopes were prepared and were sealed, each containing information about patients administered either Clonidine 1µg/kg intravenous 15 minutes before surgery (Group I) or Gabapentin 300mg orally 2 hours before surgery (Group II). After institutional ethical committee approval, patients undergoing abdominal surgery under general anesthesia of either sex with American Society of Anesthesiologists (ASA) grade I and grade II status posted for elective surgery under general anesthesia were included in the study. The patients were randomly allocated into 2 groups of 40 each, namely group I and group II. Informed written consents were taken. Data collected in pretested proforma meeting the objectives of the study.

Results : In the present study the duration of postoperative analgesic action was observed from time of reversal to first demand of analgesia in the recovery room, which was more in Group II (139.2 ± 31.46 minutes) as compared to Group I (99.62 ± 16.29 minutes) which showed oral Gabapentin was more effective as compared to intravenous Clonidine.

Conclusion : In conclusion it can be inferred that oral Gabapentin 300mg can be safely administered 2 hours before elective surgeries for better postoperative analgesia than intravenous Clonidine in abdominal surgeries, without any significant side effect.

INTRODUCTION

Recent practice of anesthesia has taken excellent care of pain relief during any surgery but the post-operative pain still remains the most horrible and unpleasant experience for patients. It creates a host of negative side effects on the patient as a whole, mainly respiratory and circulatory complications and affects the metabolic, hormonal and autonomic systems of the body. Effective control of post-operative analgesia stays one of the most important issues in the field of anesthesia with significant impact on health care system.

Opioid analgesics, with their well known side effects, continue to be a cornerstone in postoperative pain control. Testing new analgesics as well as combination of analgesics in order to reduce the need for opioids, is a key area in acute pain research [1].

Gabapentin has a selective effect on the nociceptive process involving central sensitization [2]. This drug is relatively well tolerated and belongs to a class of drugs that have anxiolytic properties [3]. It is a structural analogue of gamma amino butyric acid (GABA), is a novel anticonvulsant drug and has analgesic effects on neuropathic pain, diabetic neuropathy, post herpetic neuralgia and it has been used for postoperative pain relief [4-7].

On the other hand α2 agonist, Clonidine has shown properties that are potentially beneficial for premedication to reduce sympathetic activity and significant benefits for preoperative anxiety and postoperative analgesia [8].

MATERIALS & METHODS

This clinical study was conducted during February 2017 to March 2019 at Hi-Tech Medical College & Hospital, Bhubaneswar. We have undertaken randomized, double blind study of 80 patients undergoing lower abdominal surgeries under general anaesthesia. The study is randomized by

closed envelope method. In this 60 envelopes were prepared and were sealed, each containing information about patients either administered Clonidine 1µg/kg intravenously 15 minutes before surgery (Group I) or Gabapentin 300mg orally 2 hours before surgery (Group II). After institutional ethical committee approval, patients undergoing abdominal surgery under general anesthesia of either sex, age between 20 to 60 with American Society of Anesthesiologists (ASA) grade I and grade II status posted for elective surgery under general anesthesia were included in the study. The patients were randomly allocated into 2 groups of 40 each, namely group I and group II. Informed written consents were taken. Data collected in pretested proforma meeting the objectives of the study.

After a thorough preanesthetic checkup, detailed physical, systemic examination and required investigations all the patients were explained about visual analogue scale (VAS) and were appraised about the same during a preoperative visit one day prior to surgery.

Upon arrival to the operation theatre, venous access was secured using an 18G venous cannula. An infusion of Ringer's lactate solution was started as a bolus of 500ml. All patients received premedication with Glycopyrrolate 0.2mg, Midazolam 0.02mg/kg and Fentanyl 2µg/kg, 5 minutes before induction.

Induction was done with Inj. Thiopentone 5mg/kg and Inj. Vecuronium 0.1mg/kg to facilitate endotracheal intubation. General anesthesia was maintained on N₂O, O₂ and Isoflurane and intermittent Inj. Vecuronium. After completion of surgery, neuromuscular reversal was done with Inj. Glycopyrrolate 0.01mg/kg and Inj. Neostigmine 0.05mg/kg. Monitoring was done using standard monitor having non-invasive blood pressure (NIBP), electrocardiogram (ECG), respiratory rate, arterial pulse oxygen saturation (SPO₂).

All the patients were monitored with maintaining records of their pulse rate, systolic and diastolic blood pressure as well as oxygen saturation. Duration of analgesia, from reversal to first demand of rescue analgesia (Inj. Diclofenac 50mg) and total rescue analgesic required from first analgesic requirement to 24 hours postoperative period.

Effectiveness of pain relief in the post operative period was assessed by Visual Analogue Scale. The patient makes a mark on a 10 cm scale, horizontal or vertical, one end of which is marked as no pain and the other as the worst pain one can imagine. The position of the mark on the line measures how much pain the patient experiences.

Statistical analysis

Student's t test was used for comparison between the groups and one-way analysis of variance was used for hemodynamic parameters. P < 0.05 was considered statistically significant.

RESULTS

Table 1 shows the patient characteristics of the group I and II. There was no significant difference in patient's age, sex, type of surgery among the groups.

Table 1: Patient characteristics

| Patient characteristics | Group I | Group II |
|-------------------------|--------------|-------------|
| Age (yrs) | 35.6 ± 11.79 | 35.7 ± 12.0 |
| Sex (male/female) | 23/17 | 22/18 |
| Nature of surgery | | |
| Appendectomy | 12 | 10 |
| Exploratory laparotomy | 15 | 17 |
| Cholecystectomy | 13 | 13 |

Table 2 shows, duration of sensory blockade and analgesia is significantly higher in group II compared to group I.

Table 2: Study parameters

| Study parameters | Group I | Group II | P value |
|---|---------------|---------------|---------|
| Duration of analgesia (mins) | 99.62 ± 16.29 | 139.2 ± 31.46 | < 0.05 |
| Total rescue analgesics (IV Inj. Diclofenac in mgs) | 87.5 ± 27.73 | 75.65 ± 28.01 | < 0.05 |

The hemodynamic parameters like pulse rate and blood pressure in both the groups were comparable and there was no statistical difference observed. Duration of postoperative analgesic action was observed from time of reversal to first demand of analgesia in the recovery room, which was more in Group II (139.2 ± 31.46 minutes) as compared to Group I (99.62 ± 16.29 minutes) which showed, oral Gabapentin was more effective as compared to intravenous Clonidine. It was also observed that rescue analgesic requirement was significantly higher in Group I as compared to Group II.

DISCUSSION

Pain is "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage" as defined according to the International Association for the Study of Pain (IASP). Adequate pain management is essential to facilitate rehabilitation and accelerate functional recovery, enabling patients to return to their normal activity more quickly.

Preoperative anxiety is a major predictor of postoperative pain apart from the type of surgery, age, and related psychological distress. Anxiety lowers pain threshold, resulting in exaggeration of pain intensity. Stress and anxiety activate hypothalamic-pituitary-adrenal axis and increase glucocorticoid level.

Pain is a subjective and multifaceted personal experience which causes significant distress to patients and has adverse

effects on the endocrine and immune function, wound healing, and cardiopulmonary diseases; therefore, premedication before surgery is recommended for acute pain management. The role of anaesthesiologist is very well played to keep the patient pain free during surgery but post-operative pain still exists as a concern as it is a much neglected issue all over the globe. Apart from obvious humanitarian ground, effective post-operative analgesia results in decreased incidence of systemic complications, early return of gastrointestinal motility, early ambulation and discharge from hospital.

Chafari *et al.* studied the effects of preoperative Gabapentin or Clonidine in decreasing postoperative pain during abdominal hysterectomy and demonstrated that VAS pain score was significantly lower in two groups compared to the placebo group [9]. In the present study, similar results were observed, but patients of gabapentin group showed lesser VAS scores as compared to clonidine group. Our results are also in accordance with studies conducted by Mohammadi and Seyedi [10] and Verma [11].

Our observation clearly demonstrates that the postoperative analgesic efficacy of oral Gabapentin showed better pain tolerance compared to Clonidine without showing any significant adverse effect.

Conflicts of interest: None.

REFERENCES

- Rose, M.A. & Kam, Peter. (2002). Gabapentin: Pharmacology and its use in pain management. *Anaesthesia*. 57. 451-62. 10.1046/j.0003-2409.20.01.02399.x.
- Lee, K.J.; Kim, J.H.; Cho, S.W. Gabapentin reduces rectal mechanosensitivity and increases rectal compliance in patients with diarrhoea-predominant irritable bowel syndrome. *Aliment. Pharmacol. Ther.* 2005, 22, 981-988.
- Menigaux C, Adam F, Guignard B, et al. Preoperative gabapentin decreases anxiety and improves early functional recovery from knee surgery. *Anesth Analg* 2005;100:1394-9.
- Rao RD, Michalak JC, Sloan JA, Loprinzi CL, Soori GS, Nikkevich DA, et al. North Central Cancer Treatment Group. Efficacy of gabapentin in the management of chemotherapy-induced peripheral neuropathy: a phase 3 randomized, double-blind, placebo-controlled, crossover trial (N00C3). *Cancer* 2007;110(9):2110-8. [CTG:NCT0027963; DOI: 10.1002/cncr.23008]
- Levendoglu F, Ogun CO, Ozerbil O, Ogun TC, Ugurlu H. Gabapentin is a first line drug for the treatment of neuropathic pain in spinal cord injury. *Spine* 2004;29(7):743-51. [DOI: 10.1097/01.BRS.0000112068.16108.3A].
- Gordh TE, Stubhaug A, Jensen TS, Arner S, Biber B, Boivie J, et al. Gabapentin in traumatic nerve injury pain: a randomized, double-blind, placebo-controlled, cross-over, multi-center study. *Pain* 2008;138(2):255-66. [DOI: 10.1016/j.pain.2007.12.011].
- Rauk R, Makumi CW, Schwartz S, Graff O, Meno-Tetang G, Bell CF, et al. A randomized, controlled trial of gabapentin enacarbil in subjects with neuropathic pain associated with diabetic peripheral neuropathy. *Pain Practice* 2013;13(6):485-96. [CTG:NCT02074267; DOI: 10.1111/papr.12014].
- Hidalgo MPL, JAS Auzani, LC Rumpel, NL Moreira et al. The clinical effect of small oral clonidine doses on perioperative outcomes in patients undergoing abdominal hysterectomy. *Anesth Analg* 2005, 100: 795-802. PMID: 15728070.
- Chafari MH, Akrami M, Nouralishahi B, Sadegh A. Preoperative gabapentin or clonidine decreases postoperative pain and morphine consumption after abdominal hysterectomy. *Res J Biol Sci* 2009;4:458-63.
- Mohammadi SS, Seyedi M. Effects of gabapentin on early postoperative pain, nausea and vomiting in laparoscopic surgery for assisted reproductive technologies. *Pak J Biol Sci* 2008;11:1878-80
- Verma A. To evaluate the role of gabapentin as pre-emptive analgesic in patients undergoing total abdominal hysterectomy in epidural anaesthesia. *Indian J Anaesth* 2008;52:428-31.