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ORIGINAL ARTICLE

Comparison of Mean Analgesia Consumption for Postoperative Pain with Single Dose of Preoperative Oral Gabapentin versus Placebo in Patients Undergoing Surgery Under General Anesthesia

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ABSTRACT

Background: Postoperative pain management aims to alleviate discomfort, promote early recovery from surgery, shorten hospital stays, and increase patient satisfaction. Multimodal treatment is the best method for perioperative pain management since it reduces the requirement for opioids. For postoperative pain, the anticonvulsant medicine gabapentin is safe and effective.

Objective: To compare mean analgesia consumption for postoperative pain with single dose of preoperative oral gabapentin versus placebo in patients undergoing surgery under general anesthesia.

Design of the Study: Descriptive case series.

Place and Duration of Study: This study was carried out at Department of Anesthesia, Combined Military Hospital, Muzaffarabad from 6-1-2018 to 6-7-2018.

Patients and Methods: From the operation theatre, 60 patients who met the criteria for selection were selected. Patients were then divided into two groups at random using the lottery method. Patients in group A received gabapentin. Oral placebo capsules were administered to group B one hour prior to surgery. All patients received anaesthesia. The post-anesthesia care unit was transferred with the patients. During the first 12 hours, pain and total morphine consumption were noted. This entire data was entered into a proforma. The SPSS version 21 application was used to enter and analyze the data. Using an independent sample t-test, the mean analgesia consumption of the two groups was compared. P-values lower than 0.05 were considered significant.

Results of the Study: Patients in the gabapentin group have mean age of 42.30±6.90 yrs compared to 43.50±8.48 yrs in the placebo group. In the gabapentin group, there were 16 (53.3%) males and 14 (46.7%) women, while in the placebo group, there were 50% males and 50% women. In the gabapentin group, the mean BMI was 26.80±4.26 g/m2, while in the placebo group, it was 26.97±2.37 g/m2. After 12 hours, the mean pain score was 2.43 0.82 in the gabapentin group and 3.97±1.56 in the placebo group. The difference was statistically significant (p 0.05).The mean analgesia consumed in a 12-hour period was 10.53±1.96mg/kg in the gabapentin group versus 13.10±2.25mg/kg in the placebo group. The difference was significant statistically (p<0.05)..

Conclusion: It was shown that a single dose of gabapentin was effective in reducing the postoperative pain and amount of analgesic consumption required during the postoperative period.

Keywords: General Anesthesia, Gabapentin, Postoperative Pain, Placebo, Opioids, Morphine, Analgesia Consumption,

INTRODUCTION

Almost all individuals who have undergone surgery report experiencing some degree of acute postoperative pain following the treatment.[1] Improper postoperative pain management has also been linked to increased patient risk for serious consequences include trauma healing delays, pulmonary embolisms, and myocardial infarctions.[2,3] To reduce postoperative opioid consumption and pain levels, decrease the incidence of adverse events, and improve patient satisfaction, preemptive analgesia has been studied and implemented as an intervention given before incision since its initial proposal by Wall in 1988.[4]

The optimum method for perioperative pain control comprises of multimodal therapy to minimise the need for opioids, taking into account factors such as the patient's age, amount of fear or anxiety, surgical procedure, personal preference, and response to agents given. Surgeon-initiated opioid addiction is a potential contributor to the worldwide epidemic of opioid overprescription.[5]

Several different analgesic protocols exist for use in the operating room to alleviate discomfort. The use of opioids, local anaesthetics, NSAIDs, a2-agonists, and cyclooxygenase-2 inhibitors are all examples of such treatment plans. A multimodal analgesia regimen, including both opioid and non-opioid analgesic medicines, may increase analgesic efficacy while decreasing opioid needs and side-effects following surgery, given the variety of pain mechanisms at play.[6] Gabapentin is an anticonvulsant that has been shown to successfully treat neuropathic pain syndrome and postoperative pain in a number of clinical trials.[7] The amino acid gabapentin (1-aminomethyl-cyclohexaneacetic acid) is structurally similar to the amino acid butyric acid, which is a neurotransmitter. It's an antihyperalgesic with a novel mode of action, and it's being utilised to treat postoperative pain. It has been established that gabapentin and its related, more potent chemical pregabalin are effective in the management of neuropathic pain and postoperative pain after spinal surgery and hysterectomy.[8]

According to one study, individuals undergoing surgery under GA consumed an average of 5.8±4.2mg with a single dose of gabapentin (n=27) and 11.04±3.4mg with a placebo (n=23). (P<0.001).[9] Another study found that among patients undergoing surgery under general anaesthesia, the mean analgesic consumption was 5.17±3.0mg with single-dose gabapentin (n=30) and 10.75±3.2mg with placebo (n=30) (P<0.001).[10]

The objective of this study is to evaluate the efficacy of a single preoperative oral dose of gabapentin compared to a placebo in reducing the mean analgesia onsumption by patients undergoing surgery under general anesthesia. One study found that patients who received a single preoperative dose of gabapentin experienced much less postoperative pain and required fewer opioid pain relievers. However, we were unable to find any local study to help us in implementing gabapentin administration before surgery. Thus, we want to perform this study to obtain national magnitudes and to use the findings of this research in a regional context. This will help with the creation of better procedures and the discovery of more effective means of preventing the unnecessary use of analgesics.

PATIENTS AND METHODS

This descriptive case series study was carried out at Department of Anesthesia, Combined Military Hospital, Muzaffarabad after

receiving approval from the Institutional Review Board of the respective hospital from from 6-1-2018 to 6-7-2018. Total 60 patients who met the criteria for selection were chosen. Patient names, ages, sexes, body mass index (BMI), and types of surgeries were recorded. Patients of age between 20 – 60 years of both gender undergoing elective surgery under general anesthesia (ASA I & II) mastectomy were included in study. Patients with hypertension (BP≥140/90mmHg), diabetes (BSR>186mg/dl), anemia (Hb<10g/dL) and surgery > 90 minutes as well as patients with history of chronic intake of analgesics or corticosteroids, intake of nonsteroidal antiinflammatory drug 24 h prior to surgery on basis of medical record were excluded from the study.

Patients were then divided into two groups at random using the lottery method. Patients in group A received 600 mg of gabapentin (2 capsules of 300mg each). Oral placebo capsules were administered to group B one hour prior to surgery. The gabapentin pills with vitamin B-complex in them were the same as the placebo capsules. All patients received anaesthesia from the researcher. A consultant surgeon with at least four years of residency experience carried out all procedures. Propofol 1.5–2.5 mg/kg was used to induce general anaesthesia. 0.1 mg/kg of vecuronium was administered to aid in tracheal intubation. During the procedure, morphine was administered intravenously in a quantity of 0.1 mg/kg for analgesia. Propofol was infused to maintain anaesthesia at a rate of 75–100 mg/kg/minute, adjusted for blood pressure. Ondansetron IV, 4 mg, was administered 30 minutes before to the conclusion of operation. The post-anesthesia care unit was transferred with the patients. Up until 12 hours, adverse effects such pain, drowsiness, nausea, vomiting, and others were monitored. If VAS is greater than 4, morphine 0.05 mg/kg will be given. The total amount of morphine consumed throughout these 12 hours was noted.

The SPSS version 21 software was used to enter and evaluate the data. Age, BMI, and analgesic usage were quantitative variables that were reported as mean and SD. The frequency and percentage values for qualitative characteristics including gender, ASA, and surgical procedure were used. Using an independent sample t-test, the mean analgesia consumption of the two groups was compared. P-values lower than 0.05 were considered significant. To investigate effect modifier, data were stratified for age, gender, ASA, BMI, and surgical procedure. Independent sample t-test was applied after stratification. P-values lower than 0.05 were deemed significant.

STUDY RESULTS

Patients in the gabapentin group averaged 42.30 years old, compared to 43.50 years old in the placebo group. In the gabapentin group, there were 16 (53.3%) men and 14 (46.7%) women, while in the placebo group, there were 15 men and 15 women. In the gabapentin group, the mean BMI was 26.80 4.26 g/m2, while in the placebo group, it was 26.97 2.37 g/m2. In the gabapentin group, there were 24 (80%) patients with ASA I and 6 (20%) patients with ASA II; in the placebo group, there were 26 (86.7%) patients with ASA I and 4 (13.3%) patients with ASA II. In the gabapentin group, 1 (3.3%) had a mastectomy, 8 (26.7%) had thyroidectomies, 9 (30%) had mesh herniaplasties, and 12 (40%) had cholecystectomies. As shown in Table 1, 20 (66.7%) of the placebo group's patients underwent cholecystectomy, 5 (16.7%) underwent mesh hernioplasty, 5 (16.7%) underwent thyroidectomy, and none (0%) underwent mastectomy.

After 12 hours, the mean pain score was 2.43±±0.82 in the gabapentin group and 3.971.56 in the placebo group. The difference was significant (p 0.05). The average amount of analgesics consumed in a 12-hour period was 10.53 mg/kg in the gabapentin group versus 13.10 mg/kg in the placebo group. Table 2 demonstrates that the difference was significant (p 0.05).

A comparison of the two groups' pain scores stratified for age, gender, BMI, and ASA is given in table 3 with their statistically significant to insignificant relationship. Similarly Table 3 compares the mean analgesia consumption between the two groups stratified for age, gender, BMI, and ASA, as well as the statistically significant to insignificant relationship given.

Table 1: Derails of demographics of included patients

Characterstics	Variables	Gabapentin	Placebo	Total
Age	Mean±SD	42.30±6.90	43.50±8.48	-
Gender	Male	16(53.3%)	15(50.0%)	31(51.7%)
	Female	14(46.7%)	15(50.0%)	29(48.3%)
BMI (kg/m^2)	Mean±SD	26.80±2.46	26.97±2.37	-
ASA Physical Status	ASA-I	24(80.0%)	26(86.7%)	50(83.3%)
	ASA-II	6(20.0%)	4(13.3%)	10(16.7%)
Surgical Procedure	Cholecystecto my	12(40.0%)	20(66.7%)	32(53.3%)
	Hernioplasty	9(30.0%)	5(16.7%)	14(23.3%)
	Thyroidectomy	8(26.7%)	5(16.7%)	13(21.7%)
	Mastectomy	1(3.3%)	0(0.0%)	1(1.7%)

Table 2: Comparison of pain score and analgesia consumption in both groups

Characterstics	Variables	Gabapentin	Placebo	P-value
Pain score after 12 hours	Mean±Sd	2.43±0.82	3.97±1.56	0.000
Analgesia consumption in 12 hours	Mean±Sd	10.53±1.96	13.10±2.25	0.000

Table 3: Comparison of pain score in both groups stratified for age, gender, BMI & ASA

Characterstics	Mean Pain score	Gabapentin	Placebo	P-value
Age (years)	20-40	2.55±0.69	4.07±1.73	0.011
	41-60	2.37±0.90	3.88±1.46	0.001
Gender	Male	2.44±0.96	4.13±1.89	0.003
	Female	2.43±0.65	3.80±1.21	0.001
BMI	Normal	2.25±0.46	4.25±2.38	0.035
	Overweight	2.24±0.66	3.83±1.34	0.000
	Obese	3.40±1.14	4.00±0.00	0.334
ASA	ASA-I	2.33±0.70	3.88±1.63	0.000
	ASA-II	2.83±1.17	4.50±1.00	0.048

Table 4: Comparison of mean consumption of analgesia in both groups stratified for age, gender, BMI & ASA

Characterstics	Mean Analgesia Consumption	Gabapentin	Placebo	P-value
Age (years)	20-40	10.36±1.43	13.07±2.37	0.003
	41-60	10.63±2.24	13.13±2.22	0.002
Gender	Male	10.50±2.39	13.53±2.77	0.003
	Female	10.57±1.40	12.67±1.54	0.001
BMI	Normal	9.00±1.07	14.25±3.01	0.000
	Overweight	10.88±1.32	12.50±1.82	0.005
	Obese	11.80±3.42	13.50±1.73	0.399
ASA	ASA-I	10.38±1.47	13.04±2.27	0.000
	ASA-II	11.17±3.43	13.50±2.38	0.274

DISCUSSION

The immediate postoperative period has always included the anesthesiologist's responsibility to relieve pain, and the advent of acute postoperative pain services has expanded this concern beyond the confines of the post-anesthesia care unit. Pre-emptive analgesia has more of a purpose than just minimising nociception and stress during surgery, while these are unquestionably noble objectives.[11,12] A novel medication called gabapentin is used to treat postoperative pain. It has antihyperalgesic qualities and a different mechanism of action from other medications that are frequently used.[13]

The mean pain score after 12 hours in our trial was 2.43± 0.82 for the gabapentin group and 3.97 ±1.56 for the placebo group. The distinction was noteworthy (p 0.05). The average amount of analgesics consumed in a 12-hour period was 10.53 mg/kg in the gabapentin group versus 13.10 mg/kg in the placebo group. The distinction was noteworthy (p 0.05).

According to a research by Grover et al., patients undergoing surgery under general anaesthesia consumed an average of 5.8±4.2mg with a single dosage of gabapentin (n=27) and 11.04±3.4mg with a placebo (n=23).[9] Another study by Modak et al. found that among patients undergoing surgery under general anaesthesia, the mean analgesic consumption was 5.17±3.0mg with single-dose gabapentin (n=30) and 10.75±3.2mg with placebo.[10]

According to Doha et al., the average postoperative pain score with gabapentin was 2.2±1.3, which was considerably lower than the placebo score of 2.9±1.2 (p=0.034).[6]

Fassoulaki et al. have shown that gabapentin group in patients having mastectomy had decreased pain scores on movement during second to fifth postoperative day. They discovered no discernible difference between the placebo and gabapentin groups' resting pain levels.[14] Similar results were also found by Dirks et al. and Dierking et al. in patients after abdominal hysterectomy and mastectomy, respectively.[15,16]

Although the patients were only monitored for 4 hours following surgery, gabapentin dramatically reduced morphine use and discomfort in individuals who had had undergone surgery.[16] It's easy to tolerate gabapentin. When used to treat chronic pain, it has only modest interactions with other medications and few side effects.[17] A single oral dose of gabapentin did not appear to have any major negative effects. Our findings align with other research that have been published.[18,19]

Because it inhibits central neuronal sensitization, gabapentin may be especially helpful in treating movement-related pain following surgical trauma. Taking VAS readings when the subject is in motion may provide more useful information than taking readings while the subject is at rest. The pain ratings of participants in our study dropped significantly as they moved. In a randomised, placebo-controlled, double-blind research, Turan et al. examined the effects of gabapentin on pain following abdominal hysterectomy and the effects of gabapentin on tramadol use. Up to 20 hours following surgery, the VAS scores in the seated and supine positions were considerably lower in the gabapentin group compared to the placebo group.[19] Comparatively, Fassoulaki et al. failed to show that analgesic intake and VAS scores at rest and after movement decreased in the first 24 hours following mastectomy surgery.[20] For 10 days after surgery, patients took either 400 mg of gabapentin twice daily, 200 mg of mexiletine twice daily, or a placebo. The first dose was administered the night before the operation.[20] Disparities in our study's findings can be explained by the use of varying anaesthetic techniques and surgical procedures.

One of the limitations of our research is that we didn't have access to dose-response data prior to determining the amount of gabapentin that would be included in our study. study. Various studies have tested gabapentin in doses ranging from 300 mg to 3000 mg, with the most common being 600 mg. In some of the other studies, many doses were administered before surgery, in contrast to the single amount that we administered. Therefore, it is not possible to draw any conclusions regarding the appropriate dose of gabapentin or its length of use.

CONCLUSION

It was discovered that a single dose of gabapentin was efficient in lowering postoperative pain and analgesic usage. Currently, we have discovered local data that supports the use of a single dosage of gabapentin prophylaxis to lessen postoperative pain and ultimately analgesic intake. In general procedures going forward, gabapentin will be added before general anaesthesia. This will enable us to refine our methods and find more effective ways to curtail the overuse of analgesics.

REFERENCES

1. Misiołek H, Cettler M, Woroń J, Wordliczek J, Dobrogowski J, Mayzner-Zawadzka E. The 2014 guidelines for post-operative pain management. Anaesthesiology Intensive Therapy. 2014;46(4):221-44.
2. Parsons B, Schaefer C, Mann R, Sadosky A, Daniel S, Nalamachu S, Stacey BR, Nieshoff EC, Tuchman M, Anschel A. Economic and humanistic burden of post-trauma and post-surgical neuropathic pain among adults in the United States. Journal of pain research. 2013;6:459.
3. Abd Elhameed GA, Armanios S. Comparative Study between the Benefit of Pre-Emptive Pregabalin and Gabapentin on Acute Postoperative Pain for Elective Gynecological Surgery. Open Journal of Anesthesiology. 2019 Dec 18;9(12):227.
4. Hu J, Huang D, Li M, Wu C, Zhang J. Effects of a single dose of preoperative pregabalin and gabapentin for acute postoperative pain: a network meta-analysis of randomized controlled trials. Journal of pain research. 2018;11:2633.
5. Sun EC, Darnall BD, Baker LC, Mackey S. Incidence of and risk factors for chronic opioid use among opioid-naive patients in the postoperative period. JAMA Internal Medicine 2016;176(9):1286-93.
6. Doha NM, Rady A, El Azab SR. Preoperative use of gabapentin decreases the anesthetic and analgesic requirements in patients undergoing radical mastectomy. Egyptian Journal of Anaesthesia 2010;26(4):287-91.
7. Schmidt PC, Ruchelli G, Mackey SC, Carroll IR. Perioperative GabapentinoidsChoice of Agent, Dose, Timing, and Effects on Chronic Postsurgical Pain. The Journal of the American Society of Anesthesiologists 2013;119(5):1215-21.
8. Sharma A, Datta R, Sharma VB. Effect of oral gabapentin vs. pregabalin as preemptive analgesic for postoperative pain in patients undergoing lumbar spine surgeries. Int J Health Sci Res.2020; 10(5):181-191.
9. Grover V, Mathew P, Yaddanapudi S, Sehgal S. A single dose of preoperative gabapentin for pain reduction and requirement of morphine after total mastectomy and axillary dissection: randomized placebo-controlled double-blind trial. Journal of postgraduate medicine 2009;55(4):257.
10. Modak SD, Magar J, Kakad V. Pre-emptive gabapentin for postoperative pain relief in abdominal hysterectomy. International Journal of Research in Medical Sciences 2016;4(9):3755-9.
11. Gehling M, Tryba M. Comment on Rice ASC, Maton S, the Postherpetic Neuralgia Study Group (UK), gabapentin in postherpetic neuralgia: a randomized, double blind, placebo-controlled study. Pain 2002 Apr;96(3):410-1.
12. Turan A, Karamanlioglu B, Memis D, Usar P, Pamukcu Z, Ture M. The analgesic effects of gabapentin after total abdominal hysterectomy. Anesthesia and analgesia 2004 May;98(5):1370-3, table of contents.
13. Behdad S, Ayatollahi V, Bafghi AT, Tezerjani MD, Abrishamkar M. Effect of gabapentin on postoperative pain and operation complications: a randomized placebo controlled trial. The West Indian medical journal 2012 Mar;61(2):128-33.
14. Fassoulaki A, Patris K, Sarantopoulos C, Hogan Q. The analgesic effect of gabapentin and mexiletine after breast surgery for cancer. Anesthesia and analgesia 2002 Oct;95(4):985-91, table of contents.
15. Dierking G, Duedahl TH, Rasmussen ML, Fomsgaard JS, Moiniche S, Romsing J, et al. Effects of gabapentin on postoperative morphine consumption and pain after abdominal hysterectomy: a randomized, double-blind trial. Acta anaesthesiologica Scandinavica 2004 Mar;48(3):322-7.
16. Dirks J, Fredensborg BB, Christensen D, Fomsgaard JS, Flyger H, Dahl JB. A randomized study of the effects of single-dose gabapentin versus placebo on postoperative pain and morphine consumption after mastectomy. Anesthesiology 2002 Sep;97(3):560-4.
17. Mellick GA, Mellick LB. Reflex sympathetic dystrophy treated with gabapentin. Arch Phys Med Rehabil. 2007;78:98–105.
18. Pandey CK, Singhal V, Kumar M, Lakra A, Ranjan R, Pal R, et al. Gabapentin provides effective postoperative analgesia whether administered preemptively or post-incision. Can J Anaesth. 2005;52:827–31.
19. Turan A, Karamanlioğlu B, Memiş D, Usar P, Pamukçu Z, Türe M. The analgesic effects of gabapentin after total abdominal hysterectomy. Anesth Analg. 2004;98:1370–3.
20. Fassoulaki A, Patris K, Sarantopoulos C, Hogan Q. The analgesic effect of gabapentin and mexiletine after breast surgery for cancer. Anesth Analg 2002; 95:985-91.