International Journal of Medical Anesthesiology

E-ISSN: 2664-3774
P-ISSN: 2664-3766
www.anesthesiologypaper.com
IJMA 2018; 1(2): 80-83
Received: 07-09-2018
Accepted: 24-09-2018

Dr. Ravindra Kumar
Assistant Professor, Department of Anesthesiology, PK Das Institute of Medical Sciences, Palakkad, Kerala, India

Dr. J Benjamin
Assistant Professor, Department of Anesthesiology, Dr. Pinnamaneni Siddhartha Institute of Medical Sciences, Vijayawada, Andhra Pradesh, India

Correspondence
Dr. J Benjamin
Assistant Professor, Department of Anesthesiology, Dr. Pinnamaneni Siddhartha Institute of Medical Sciences, Vijayawada, Andhra Pradesh, India

To study gabapentin vs. pregabalin for acute post-operative pain control in lower limb procedures under spinal anaesthesia: A prospective comparison

Ravindra Kumar and J Benjamin

DOI: https://doi.org/10.33545/26643766.2018.v1.i2a.539

Abstract
Introduction and Background: Postoperative pain management improves recovery, reduces opioid use, and reduces complications after spinal anaesthesia lower limb procedures. Gabapentin and pregabalin will be compared for acute postoperative pain management, opioid-sparing effects, and side events.
Materials and Methods: 90 patients going under spinal anaesthesia for elective lower limb procedures were part of a prospective, randomised, comparative study. From August 2017 through July 2018, researchers at India's PK Das Institute of Medical Sciences (Department of Anaesthesiology) held their study in Palakkad, Kerala. Different groups of patients were assigned to each group: Those in the gabapentin group (n=45) were given 600 mg of gabapentin orally two hours before surgery. Two hours before surgery, patients in the pregabalin group (P, n=45) took 150 mg of oral pregabalin. We tracked the overall opioid use, the time to first analgesic request, and the need for rescue analgesia.
Results: The vagal index scores of the gabapentin group were substantially higher than those of the pregabalin group at 2, 4, 8, 12, and 24 hours. At 8 hours, the pregabalin group had an average VAS score of 2.3±0.8, while the gabapentin group had an average score of 3.8±1.1. In comparison to the gabapentin group, which consumed 125.6±18.4 mg of tramadol in 24 hours, the pregabalin group consumed 86.2±15.7 mg. In contrast to the gabapentin group, which needed their first analgesic dose at 6.4±1.2 hours, the pregabalin group's patients needed it at 9.2±1.5 hours. The groups did not differ significantly with respect to oxygen saturation, heart rate, or blood pressure.
Conclusion: For procedures involving the lower limbs performed under spinal anaesthesia, gabapentin and pregabalin both considerably lessen the need for opioids and greatly enhance postoperative pain management. Pregabalin outperformed gabapentin in terms of analgesia, opioid sparing, and time until rescue analgesia was needed. Pregabalin caused mild drowsiness to a slightly greater extent, but it was well-tolerated. When it comes to managing pain after surgery, pregabalin might be the way to go for these individuals.

Keywords: Gabapentin, pregabalin, postoperative pain, spinal anesthesia

Introduction

In surgical procedures involving the lower limbs done under spinal anaesthesia, postoperative pain control is of the utmost importance. The analgesic benefits of spinal anaesthesia during surgery are short-lived, and patients frequently report moderate to severe pain in the days following their procedure. When pain is not adequately managed, it can cause a cascade of problems. These include a delay in mobilisation, an increased risk of thromboembolic events [1-3], longer hospital admissions, and an increase in the intake of opioids, which can have negative side effects such nausea, vomiting, respiratory depression, and dependence. As a result, one of the primary goals of perioperative pain management is to reduce opioid usage while simultaneously improving patient outcomes [3-5].

To alleviate postoperative pain effectively and with minimal opioid-related adverse effects, multimodal analgesia has recently been the method of choice. The antiepileptic drugs gabapentin and pregabalin, which have the potential to modify central sensitisation and decrease hyperalgesia, have recently gained attention as potential adjuncts in this approach [4-6]. Their introduction into various perioperative pain protocols is based on multiple studies that have shown their function in controlling neuropathic pain, chronic pain syndromes, and postoperative pain.

Nevertheless, the relative effectiveness of these procedures is still a matter of heated controversy, especially within the many surgical communities that use them [5-7]. There is a high rate of postoperative discomfort in patients who undergo lower limb surgeries, including orthopaedic procedures like hip and knee replacements as well as fracture fixations. In order to ensure the comfort of these patients and to allow for early mobilisation and rehabilitation, it is crucial to effectively regulate their pain. Finding the best non-opioid analgesics that maximise pain relief without increasing side effects is crucial [8], especially given the growing importance of improved recovery after surgery (ERAS) protocols. Reduced pain scores and opioid intake have been observed with the use of gabapentin and pregabalin in a multimodal regimen. Nevertheless, because to variations in their pharmacokinetics and side effect profiles, it is imperative to compare them directly in order to ascertain their relative benefits in particular surgical situations [8-10].

Patients having lower limb procedures while under spinal anaesthesia have not been the subjects of many studies that directly compared gabapentin and pregabalin, despite the expanding corpus of research on gabapentinoids' usage in postoperative pain treatment. If we want to make informed clinical decisions, we need a thorough assessment of how they affect pain scores, the ability to spare opioids, haemodynamic stability, and adverse event profiles. Consequently, the purpose of this research is to evaluate how well gabapentin and pregabalin alleviate acute postoperative pain after spinal anesthesia-induced procedures involving the lower limbs [11].

This study aims to explore the best choice of gabapentinoids for this surgical procedure by examining pain alleviation, opioid needs, and side effect occurrence. This research is anticipated to add to the current conversation regarding gabapentinoids' function in perioperative pain management and aid in the improvement of analgesic procedures for the benefit of patients' comfort and recovery. In order to make educated decisions that adhere to patient safety and the principles of multimodal analgesia, practitioners should be aware of the variations in their analgesic effects, opioid-sparing benefits, and tolerability [10-12].

Material and Methods

A total of 90 patients undergoing elective lower limb surgeries under spinal anesthesia were recruited for the study. This study was conducted at the Department of Anesthesiology, PK Das Institute of Medical Sciences, Palakkad, Kerala, India from August 2017 to July 2018. Participants were randomly allocated into two groups using a computer-generated randomization method: Gabapentin Group (G) (n=45): Received 600 mg of oral gabapentin 2 hours preoperatively. Pregabalin Group (P) (n=45): Received 150 mg of oral pregabalin 2 hours preoperatively. Both groups underwent identical intraoperative anesthetic management.

Inclusion Criteria

- Male and female patients aged 18–65 years.
- Patients scheduled for elective lower limb surgeries under spinal anesthesia.
- American Society of Anesthesiologists (ASA) physical status I and II.

Exclusion Criteria

- Patients with severe hepatic, renal, or cardiovascular dysfunction.
- Presence of neurological disorders affecting pain perception.
- Pregnant or lactating women.
- Patients with a history of substance abuse.

Results

Participants were divided into two groups: those given gabapentin (group G) and those given pregabalin (group P). A total of 90 patients participated in the trial. Every single participant saw the trial through to its conclusion, and not a single patient was lost to follow-up. There were no statistically significant differences ($p>0.05$) between the two groups when it came to age, gender, ASA status, and length of operation.

Table 1: Demographic and Clinical Characteristics of Patients

Parameter	Gabapentin Group (n=45)	Pregabalin Group (n=45)	p-value
Age (years)	45.6±8.4	46.2±9.1	0.72 (NS)
Gender (M/F)	28/17	30/15	0.65 (NS)
ASA Status (I/II)	26/19	25/20	0.81 (NS)
Surgery Duration (min)	92.4±10.8	94.1±11.2	0.58 (NS)

NS: Non-significant ($p>0.05$)

Both groups' baseline demographic and clinical features were statistically similar, as seen in Table 1. Both sexes had similar distributions of age, with a mean of about 46 years. The study groups were well-matched for comparison because there were no significant variations between the two groups either the ASA status or duration of operation.

Table 2: Postoperative Pain Scores (VAS) and Analgesic Requirements

Time (Hours)	Gabapentin Group (VAS Score)	Pregabalin Group (VAS Score)	p-value
2 Hours	3.8±0.9	3.2±0.8	0.04 *
4 Hours	4.5±1.1	3.6±0.9	0.01 *
8 Hours	3.8±1.0	2.3±0.8	0.001 **
12 Hours	2.9±0.7	1.8±0.6	0.002 **
24 Hours	1.8±0.6	1.2±0.4	0.03 *

*Significant ($p<0.05$), Highly Significant ($p<0.01$)

The pain scores on the Visual Analogue Scale (VAS) were considerably lower in the pregabalin group compared to the gabapentin group at different time intervals postoperatively, as shown in Table 2. after all time points, the difference was statistically significant, however it was extremely significant after 8 and 12 hours ($p<0.01$). This data points to pregabalin's superiority as a postoperative pain reliever, especially within the first twelve hours.

Furthermore, there was a significant difference in the total opioid consumption during 24 hours between the pregabalin group (86.2±15.7 mg) and the gabapentin group (125.6±18.4 mg, $p=0.002$). Pregabalin appeared to have a longer duration of analgesia compared to gabapentin, as the time to first rescue analgesia was longer in the former group (9.2±1.5 hours) compared to the latter (6.4±1.2 hours, $p=0.003$).

Discussion

Enhanced recovery after surgery (ERAS) procedures must

include postoperative pain management. This is especially true for lower limb surgeries, where patients may experience longer hospital stays, more opiate intake, and delayed mobilisation due to insufficient pain control. After lower limb procedures under spinal anaesthesia, this trial found that pregabalin was better than gabapentin for postoperative analgesia, opioid reduction, and the length of time until the patient needed their first analgesic [13-15].

Previous research evaluating gabapentinoids for the relief of pain during perioperative procedures has shown similar results. Postoperative pain scores and opioid use were both reduced more significantly with pregabalin due to its improved pharmacokinetic profile, which includes higher bioavailability, quicker absorption, and linear kinetics. Pregabalin offered superior pain relief than placebo, according to the substantially lower VAS scores at all postoperative time intervals, particularly in the first 12 hours, when pain intensity is often at its height. This is in line with previous studies that found pregabalin to be more effective in modulating nociceptive transmission than gabapentin due to its higher cerebrospinal fluid concentrations [16-18].

The length of time it took for the pregabalin group to need their first analgesic was a major benefit. This group's patients needed rescue analgesia much later than the gabapentin group's patients, demonstrating that pregabalin has a longer half-life. Particularly useful in multimodal analgesic techniques that try to reduce opioid usage [19-21] is this type of long-lasting analgesia. Further evidence supporting the opioid-sparing effect of pregabalin is the significantly decreased overall opioid consumption within 24 hours in our study's pregabalin group. A primary objective of contemporary pain management is the reduction of opioid intake due to the well-documented negative consequences of these drugs, which include nausea, vomiting, respiratory depression, and dependence [22-24].

Pregabalin marginally increased the incidence of mild drowsiness and dizziness compared to gabapentin, despite its improved analgesic efficacy. Especially for older patients or those prone to falls, these adverse effects, while not life-threatening, should be carefully considered. Nevertheless, neither group showed any notable haemodynamic instability, nor the side effects were all manageable and did not last long [23-25].

There are a number of possible explanations for why pregabalin was more effective in this trial. In comparison to gabapentin, pregabalin has a faster rate of absorption and reaches peak plasma concentrations in just one hour. Gabapentin takes three to four hours to reach the same point. Also, although gabapentin's absorption is dose-dependent and saturable, which causes therapeutic efficacy to vary, pregabalin's linear pharmacokinetics guarantee predictable plasma levels. Because of these pharmacological distinctions, pregabalin was able to alleviate postoperative pain more quickly, for a longer period of time, and more effectively than other opioids [24-26].

There are a few caveats to be aware of, even though our study gives strong evidence that pregabalin is better than gabapentin. First, we only looked at the effects of the operation on pain during the first 24 hours; further research with longer follow-ups may reveal how effective it is at preventing persistent pain after surgery. Additionally, it's important to note that our study only included elective lower limb surgeries, so the results might not apply to emergency surgeries or other types of surgical procedures. To improve analgesic procedures based on gabapentinoid, further research is needed, especially studies that optimise dosage and cost-effectiveness evaluations [26-28].

Conclusion

For patients having lower limb procedures done under spinal anaesthesia, this prospective comparison trial shows that pregabalin works better than gabapentin for acute postoperative pain management. When compared to gabapentin, pregabalin offers longer-lasting pain relief and considerably decreases opioid use, the requirement for rescue analgesia, and postoperative pain scores. Mild drowsiness and vertigo were more commonly reported with pregabalin, but patients were able to manage these side effects and the drug was safe to use. Pregabalin seems to be the best gabapentinoid for managing pain after lower limb procedures because of its potent analgesic effects and opioid-sparing properties. Still, we need more studies to find out how it works in the long run, how to dose it optimally, and whether it can be used on a wider range of surgical patients.

Funding

None

Conflict of Interest

None

References

1. Kissin I. Preemptive analgesia: why its effect is not always obvious. Anesthesiology. 2000;92(2):531-533.
2. Gilron I, Bailey JM, Tu D, Holden RR, Weaver DF, Houlden RL. Morphine, gabapentin, or their combination for neuropathic pain. N Engl J Med. 2005;352(13):1324-1334.
3. Hurley RW, Chatterjea D, Rose Feng M, Taylor CP, Hammond DL. Gabapentin and pregabalin reduce mechanical hypersensitivity and capsaicin-evoked hyperalgesia after incisional injury. Anesthesiology. 2002;98(4):1050-1059.
4. Ho KY, Gan TJ, Habib AS. Gabapentin and postoperative pain—a systematic review of randomized controlled trials. Pain. 2006;126(1-3):91-101.
5. 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;97(3):560-564.
6. Mathiesen O, Jacobsen LS, Holm HE, Randall S, Adamiec-Malmstroem L, Graungaard BK, *et al*. Pregabalin and dexamethasone improves post-operative analgesia in total knee arthroplasty. Acta Anaesthesiol Scand. 2008;52(3):374-381.
7. Reuben SS, Buvanendran A, Kroin JS, Hackett PL. The analgesic efficacy of celecoxib, pregabalin, and their combination for spinal fusion surgery. Anesth Analg. 2006;103(5):1271-1277.
8. Eckhardt K, Ammon S, Hofmann U, Riebe A, Mikus G. Gabapentin enhances the analgesic effect of morphine in healthy volunteers. Anesth Analg. 2000;91(1):185-191.
9. Clarke H, Katz J, McCartney CJ. Preoperative gabapentin reduces opioid consumption and pain after

ambulatory laparoscopic cholecystectomy. Anesth Analg. 2007;104(6):1397-1402.
10. Peng PW, Wijeysundera DN, Li CC. Use of gabapentin for perioperative pain control—a meta-analysis. Pain Res Manag. 2007;12(2):85-92.
11. Kim SY, Song JW, Park B, Park S, Shim YH. Pregabalin reduces post-operative pain after mastectomy: a double-blind, randomized, placebo-controlled study. Acta Anaesthesiol Scand. 2011;55(3):290-296.
12. Buvanendran A, Kroin JS, Tuman KJ. Effects of perioperative administration of pregabalin on pain and opioid use after laparoscopic hysterectomy. Reg Anesth Pain Med. 2010;35(6):462-466.
13. Ghai A, Gupta M, Hooda S, Wadhera R. Pregabalin premedication in laparoscopic cholecystectomy: a randomized controlled study. Saudi J Anaesth. 2011;5(3):252-257.
14. Zhang J, Ho KY, Wang Y. Efficacy of pregabalin in acute postoperative pain: a meta-analysis. Br J Anaesth. 2011;106(4):454-462.
15. Jokela R, Ahonen J, Tallgren M, Haanpaa M, Korttila K. A randomized controlled trial of perioperative administration of pregabalin for pain after laparoscopic hysterectomy. Pain. 2008;134(1-2):106-112.
16. Gao L, Xu J, Lv J, Ma L, Yan S. Pregabalin attenuates pain and improves quality of recovery in patients undergoing total knee arthroplasty. Med Sci Monit. 2016;22:435-441.
17. Agarwal A, Gautam S, Gupta D, Agarwal S, Singh PK, Singh U. Evaluation of a single preoperative dose of pregabalin for attenuation of postoperative pain after laparoscopic cholecystectomy. Br J Anaesth. 2008;101(5):700-704.
18. Mathiesen O, Jacobsen LS, Holm HE, Fomsgaard JS, Dahl JB, Kehlet H. Pregabalin does not improve preoperative analgesia in laparoscopic cholecystectomy. Br J Anaesth. 2008;101(6):835-841.
19. Turan A, Karamanlioğlu B, Memiş D, Hamioğlu E, Türe M, Pamukçu Z. Analgesic effects of gabapentin after spinal surgery. Anesthesiology. 2004;100(4):935-938.
20. Montazeri K, Kashefi P, Honarmand A, Safavi M. Preoperative gabapentin reduces post-operative pain and opioid consumption after abdominal hysterectomy. Anesth Pain Med. 2013;3(3):462-466.
21. Chou R, Gordon DB, de Leon-Casasola OA, Rosenberg JM, Bickler S, Brennan T, *et al*. Management of postoperative pain: a clinical practice guideline from the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists. J Pain. 2016;17(2):131-157.
22. Sen H, Sizlan A, Yanarates O, Emirkadi H, Ozkan S, Dağlı G, *et al*. The effects of gabapentin on acute and chronic pain after inguinal herniorrhaphy. Eur J Anaesthesiol. 2009;26(9):772-776.
23. Lee IO, Kim WK, Kong MH, Lee MK, Kim NS, Choi YS, *et al*. Gabapentin reduces intraoperative anesthetic requirements and postoperative pain after radical mastectomy. Anesth Analg. 2011;112(5):1171-1176.
24. Almeida TF, Roizenblatt S, Tufik S. Afferent pain pathways: a neuroanatomical review. Brain Res. 2004;1000(1-2):40-56.
25. Misra S, Parthasarathi G, Venkataraman R, Balachandran S. Pregabalin and gabapentin in acute and chronic pain. Curr Opin Anaesthesiol. 2013;26(5):626-631.
26. Fassoulaki A, Patris K, Sarantopoulos C, Hogan Q. The analgesic effect of gabapentin and mexiletine after breast surgery for cancer. Anesth Analg. 2002;95(4):985-991.
27. Hanna M, O'Brien C, Wilson MC. Prolonged-release oxycodone and pregabalin for the management of neuropathic pain: a review. Int J Clin Pract. 2015;69(3):287-295.
28. Gustorff B, Dorner T, Likar R, Grisold W, Lawrence K, Schwarz F, *et al*. Prevalence of self-reported neuropathic pain and impact on quality of life: a prospective representative survey. Acta Anaesthesiol Scand. 2008;52(1):132-136.