Indian Journal of Clinical Anaesthesia 2024;11(4):511–517

Content available at: https://www.ipinnovative.com/open-access-journals

Indian Journal of Clinical Anaesthesia

Journal homepage: www.ijca.in

Original Research Article

A comparison of analgesic efficacy between oral pregabalin, gabapentin, and melatonin as non-opioid anaesthesia for robotic-assisted laparoscopic surgeries: A prospective randomized double-blinded clinical study

Monica Daisy[1], **Girimurugan Nagarajan**[1], **Nagapriya Nagendran**[1]*

[1] *Dept. of Anaesthesiology and Pain Medicine, Saveetha Institute of Medical and Technical Sciences, Tamil Nadu, India*

ARTICLE INFO

Article history:
Received 18-04-2024
Accepted 04-10-2024
Available online 07-11-2024

Keywords:
Analgeasia
Pregabalin
Gabapentin
Non- opiod anasthesia
Robotic surgery
Robotic Laproscopy
Melatonin
Laproscopic surgery

ABSTRACT

Background: Opioid-sparing anesthesia is increasingly used in surgery, though effectiveness varies. Given the anxiety-pain correlation, anxiolytics like gabapentinoids and melatonin may offer benefits. This study compares the preemptive use of pregabalin, gabapentin, and melatonin for postoperative analgesia in robotic-assisted laparoscopic surgeries (RALS).

Aim and Objective: The aim of this study is to investigate postoperative analgesia in patients undergoing robotic-assisted laparoscopic surgeries under non-opioid anesthesia. The objectives are to evaluate perioperative hemodynamics, assess the perioperative sedation score during the surgical procedures, determine the requirement for rescue analgesia in the postoperative period, and measure the perioperative anxiety score in patients undergoing these surgeries.

Materials and Methods: Sixty patients, aged 18-60 with ASA PS grade 1 & 2 and BMI < 35 kg/m^2, undergoing elective robotic-assisted laparoscopic surgeries (RALS) were randomly assigned to receive pregabalin (Group P), gabapentin (Group G), or melatonin (Group M). After standard pre-anesthetic assessments and premedication, patients received pregabalin 150 mg, gabapentin 900 mg, or melatonin 6 mg one hour before surgery. Hemodynamics and anxiety, VAS, and sedation scores were monitored postoperatively at 1, 2, 6, and 12 hours. Primary outcome was postoperative analgesia assessed by VAS, with rescue analgesia administered for VAS > 4.

Results: Baseline characteristics were balanced among groups. Gabapentin significantly reduced VAS scores (1.25 ± 0.44) and extended time to rescue analgesia (9.48 ± 0.69 hours). Anxiety scores and Ramsay sedation scores (1.45 ± 0.51) were comparable, but Group G showed lower sedation. Hemodynamics remained stable.

Conclusion: Gabapentin improved postoperative pain outcomes in RALS, supporting its use for individualized pain management in these surgeries. Differences in pain intensity, time to rescue analgesia, and sedation levels highlight the need for personalized approaches. Further research in various surgical contexts is recommended to optimize perioperative care.

1. Introduction

Opioid-sparing or opioid-free anesthesia is increasingly used in daily practice due to its variable effectiveness across surgeries and patient populations.[1] Studies show a positive correlation between anxiety and pain, suggesting that reducing anxiety can lessen postoperative pain.[2,3] Gabapentinoids like pregabalin, known for their anxiolytic and analgesic effects, and melatonin, recognized for its analgesic, anxiolytic, and sedative properties without

* *Corresponding author.*
E-mail address: manjumathesan@gmail.com (N. Nagendran).

https://doi.org/10.18231/j.ijca.2024.093

cognitive disturbances, are proposed alternatives to benzodiazepines.[4]

Common surgical procedures such as prostatectomy, nephrectomy, pyeloplasty, appendicectomy, cholecystectomy, and ovarian cystectomy are frequently conducted using laparoscopic techniques to minimize postoperative complications, including prolonged hospital stays, postoperative pain, and delayed ambulation.[5] The robotic-assisted laparoscopic approach (RALS) further reduces these issues due to its less invasive nature, offering benefits such as improved cosmesis, reduced postoperative pain, fewer wound complications, and faster recoveries with shorter hospital stays.[6]

Despite being minimally invasive, robotic-assisted laparoscopic surgeries (RALS) often results in mild to moderate postoperative pain. Multimodal analgesia with non-opioid anesthesia aims to decrease opioid usage and related adverse effects, facilitating early discharge. Standardized research recommends preemptive use of oral pregabalin, gabapentin, or melatonin to manage postoperative pain, anxiety, and hemodynamics in such patients. This study specifically compares the efficacy of preemptive oral pregabalin (150mg), gabapentin (900mg), and melatonin (6mg) in managing postoperative pain in patients undergoing RALS.[7,8] The objectives are to evaluate perioperative hemodynamics, sedation scores, rescue analgesia requirements, and anxiety levels, aiming to optimize perioperative care and enhance patient satisfaction.

The primary objective of this study was to compare the analgesic efficacy of oral Pregabalin, Gabapentin, and Melatonin as pre-emptive non-opioid analgesics in patients undergoing robotic-assisted laparoscopic surgeries (RALS). This study aims to determine which medication provides the most effective postoperative pain control, thereby minimizing the need for opioid-based pain management.[9]

1.1. Sample size calculation

For this three-arm study, the sample size calculation was based on comparing the means of three different groups (Pregabalin, Gabapentin, and Melatonin) using a Bonferroni correction to account for multiple comparisons. This sample size calculation is consistent with previous study by Nasr and Abdellatif, which explored similar interventions in perioperative pain management.[10] The formula for calculating the sample size per group is:

$$N = \left(\frac{Z_{\alpha/2}+Z_{\beta}}{\Delta}\right)^2 \times 2\delta^2$$

1.2. Bonferroni correction

The Bonferroni correction adjusts the significance level to control for the overall type I error rate. For three comparisons, the adjusted significance level α' is given by: $\alpha' = \alpha/3$

Where:

$\alpha = 0.05$ (desired significance level)

$\alpha' = 0.0167$

The corresponding Z-value for $\alpha'/2 = 0.0167$ is approximately 2.39.

Power ($Z\beta = 0.84$ (for 80% power)

Standard deviation (σ 0 = 1

Expected difference (Δ) = 1

Substituting these values into the sample size formula: N=20 participants per group were required to ensure adequate power and account for multiple comparisons between the three groups.

2. Materials and Methods

Following approval from the Institutional Ethics Committee (IEC No.- SMC/IEC/2022/09/010), a total of 60 patients randomly distributed into three groups: Group P (n = 20), Group G (n = 20), and Group M (n = 20).

2.1. Inclusion criteria & exclusion criteria

Inclusion criteria for the study were patients with ASA PS grade 1 and 2, undergoing elective surgical procedures, aged 18-60 years, and with a BMI less than 35 kg/m^2. Exclusion criteria included those undergoing emergency surgical procedures, patients with a history of chronic pain syndrome, and those with hepatic, neurological, renal, respiratory, and cardiac pathologies. Patients allergic to gabapentin, pregabalin, or melatonin, those with a difficult airway, a history of seizure disorder, an ASA PS grade higher than 3, electrolyte abnormalities, and those who refused to participate were also excluded.

2.2. Methods

After standard pre-anesthetic assessments, patients received oral alprazolam 0.5 mg the night before surgery and oral pantoprazole 40 mg both the night before and the morning of the surgery. Adhering to ASA guidelines, a fasting protocol was implemented. Baseline vitals and anxiety scores were recorded. Through computer-generated randomization and double-blinding, patients were assigned to Group P, Group G, or Group M, and received oral medications (Tab. Pregabalin 150 mg, Tab. Gabapentin 900 mg, and Tab. Melatonin 6 mg) preemptively one hour before surgery with sips of water.

Upon transfer to the operating theatre, intravenous access was confirmed, and patients were started on intravenous fluids. Essential monitors (ECG, NIBP, SpO2, and capnography) were connected, and vitals were recorded before induction. Patients were induced with Inj. Glycopyrrolate 0.01 mg/kg. A mixture of Inj. Paracetamol 1gm, Inj. Loxicard 1.5mg/kg, and Inj. Magnesium sulfate 1 gm was infused over 10 minutes. Inj. Dexmedetomidine was administered with a loading dose of 1 mcg/kg/hr, followed by a maintenance infusion of 0.5 mcg/kg/hr

throughout the surgery, ceasing at specimen ligation. Vitals were recorded at 10 and 15 minutes after the infusion. After preoxygenation, patients were induced with Inj. Propofol 2mg/kg, followed by Inj. Atracurium 0.5mg/kg for intubation. Mechanical ventilation with sevoflurane was maintained, and intermittent doses of Inj. Atracurium was administered with TOF monitoring.

At the procedure's conclusion, Inj. Ondansetron 8 mg was given, and after spontaneous efforts by the patient, neuromuscular blockade was reversed with Inj. Neostigmine 0.05mg/kg and Inj. Glycopyrrolate 0.01mg/kg, followed by extubation. Patients were then transferred to the PACU for further observation, and the surgery duration did not exceed 5 hours. Hemodynamics, including heart rate (HR), NIBP, and SpO2, were recorded after shifting patients to the PACU. Anxiety, VAS, and sedation scores were monitored at 1 hour, 2 hours, 6 hours, and 12 hours postoperatively. The primary objective was postoperative analgesia, assessed using the visual analog scale (VAS). Patients with VAS>4 was relieved from the study and received rescue analgesia with Inj. Ketorolac 30mg intramuscularly, Inj. Paracetamol 1 gm q6 hourly, and Inj. Fentanyl 50 mcg bolus, followed by further monitoring.

2.3. Statistical analysis

Baseline characteristics, including age, gender, and anxiety scores, were compared among the groups. Continuous variables such as age and anxiety scores were analyzed using one-way ANOVA, while categorical variables like gender were compared using chi-square tests.

Postoperative analgesia was measured using visual analog scale (VAS) scores at multiple time points (1, 2, 6, and 12 hours) post-surgery and analyzed with repeated measures ANOVA to assess within-group changes over time and between-group differences. Perioperative hemodynamics (heart rate, non-invasive blood pressure, and oxygen saturation) and the requirement for rescue analgesia were similarly analyzed using repeated measures ANOVA.

Adverse events were recorded and compared using chi-square tests. Subgroup analyses based on age, gender, and baseline anxiety levels were conducted to identify differential effects of the interventions within specific patient subpopulations. Statistical significance was set at $p < 0.05$, and confidence intervals (CIs) were provided where applicable. SPSS version 22.0 was used for all statistical analyses, ensuring robust and reliable results. This comprehensive approach enabled a thorough and nuanced analysis of the data, supporting the study's conclusions.

3. Results

The mean age of the study participants was 45.1 ± 7.9 years.Table 1 presents the baseline characteristics of the study participants across three groups (Group G, Group M, and Group P). The mean age of participants in Group G, Group M, and Group P was 46.65 ± 1.19, 43.15 ± 6.93, and 45.50 ± 9.33 years, respectively. The analysis revealed no statistically significant difference in age among the groups (p = 0.366). Regarding gender distribution, the percentages of males and females in each group were comparable, with no significant difference observed (p = 0.760). Body Mass Index (BMI) showed mean values of 25.21 ± 1.78, 24.47 ± 1.58, and 24.39 ± 1.33 kg/m2 in Group G, Group M, and Group P, respectively, and the differences were not statistically significant (p = 0.197). The distribution of ASA (American Society of Anesthesiologists) classifications 1 and 2 also exhibited no significant difference among the groups (p = 0.122). Overall, the baseline characteristics were well-balanced across the three groups, indicating successful randomization and minimizing potential confounding factors in the subsequent analyses.

It shows that there was a significant difference in the VAS scores among the groups (F = 21.061, p = 0.0005), suggesting variations in postoperative pain intensity immediately upon shifting to the PACU. Group G and Group M showed a statistically significant difference in mean VAS scores (-0.9500, p = 0.0005), indicating that the postoperative pain intensity, measured immediately upon shifting to the PACU, was significantly lower in Group G compared to Group M. Similar findings were observed between Group P and both Group G (-0.8500, p = 0.0005) and Group M (-0.9500, p = 0.0005). However, there was no significant difference in mean VAS scores between Group M and Group P.

The time to rescue analgesia from oral drug intake significantly differed among the groups (F = 150.222, p = 0.0005), indicating variations in the duration before patients required additional analgesia seen in (Figure 1). Group G exhibited a significantly longer time to rescue analgesia compared to Group M (4.1500, p = 0.0005) and Group P (2.9050, p = 0.0005). Similarly, Group M had a significantly longer time to rescue analgesia compared to Group P (-1.2450, p = 0.0005). These results suggest that patients in Group G experienced a delayed need for additional analgesia compared to the other two groups.

While there were no statistically significant differences in anxiety scores before drug intake (F = 2.580, p = 0.085) or one hour after medication (F = 0.271, p = 0.764), the anxiety score in the postoperative PACU period showed a borderline significance (F = 2.803, p = 0.069) shown in (Figure 2).

The Ramsay sedation score significantly differed among the groups (F = 9.444, p = 0.0005), indicating variations in sedation levels in the post-anesthesia care unit. Group G showed a significantly lower Ramsay sedation score compared to Group P (-0.5000, p = 0.0004) and Group M (-0.4000, p = 0.005). This indicates that patients in Group G were less sedated in the post-anesthesia care unit (PACU)

Table 1: Baseline characteristics of study participants

Parameter	Group G n=20 (%)	Group M n=20 (%)	Group P n=20 (%)	p-value
Age in years (mean ± SD)	46.65 ± 1.19	43.15 ± 6.93	45.50 ± 9.33	0.366
Gender				
Male	9 (45)	7 (35)	9 (45)	0.760
Female	11 (55)	13 (65)	11 (55)	
BMI (mean ± SD)	25.21 ± 1.78	24.47 ±1.58	24.39 ±1.33	0.197
ASA				
1	0 (0)	4 (20)	3 (15)	0.122
2	20 (100)	16 (80)	17 (85)	

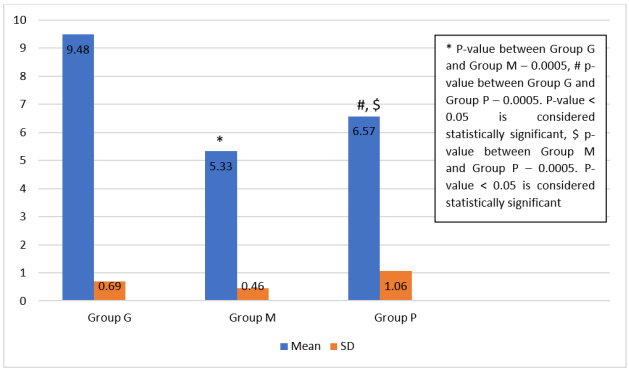


Figure 1: Time to rescue analgesia from oral drug intake

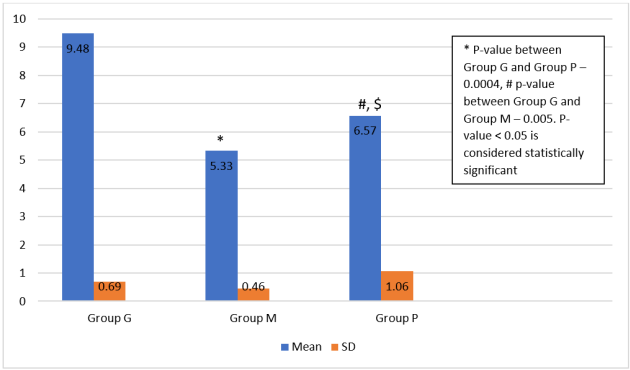


Figure 3: Ramsay sedation score in PACU

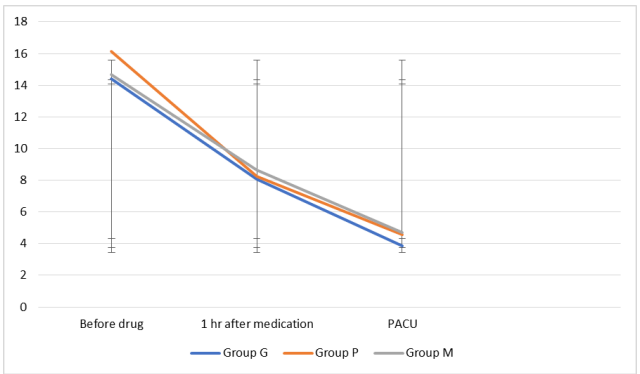


Figure 2: Anxiety score in the study participants

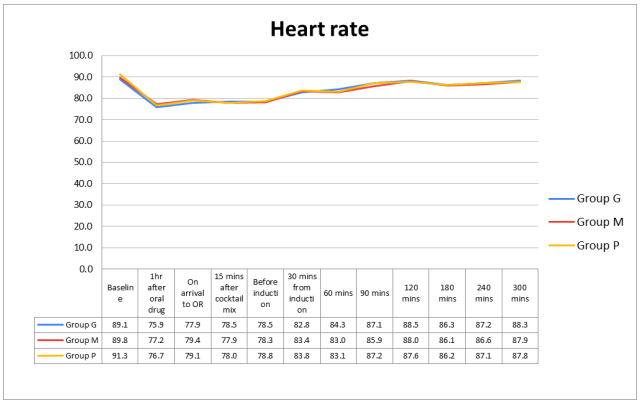


Figure 4: Heart rate in the study participants

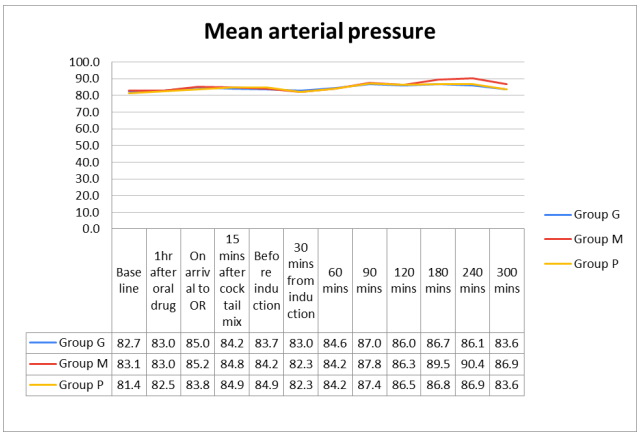
compared to Group M and Group P. However, there was no significant difference in Ramsay sedation scores between Group M and Group P as depicted in (Figure 3).

Figure 4 illustrates no significant differences were found in heart rate among the groups at various time points, including 1 hour after oral drug intake, on arrival to the operating room (OR), 15 minutes after the cocktail mixture, before induction, 30 minutes from induction, 60 minutes, 90 minutes, 120 minutes, 180 minutes, 240 minutes, and 300 minutes postoperatively. The p-values for these time points were all above the conventional threshold of 0.05.

There were no significant differences in SBP at several time points, significant variations were observed at 240 and 300 minutes postoperatively, with Group G generally showing lower SBP than Group M, and Group P showing higher SBP than Group M at 240 minutes postoperatively as shown in (Figure 5). At 240 minutes postoperatively, significant differences were observed between Group G and Group M (MD = -4.3000, p = 0.003), with Group G having lower SBP. Significant differences were also found between Group M and Group P (MD = 3.1000, p = 0.039), with Group P having a higher SBP. At 300 minutes postoperatively, significant differences were

observed between Group G and Group M (MD = -4.9500, p = 0.037), with Group G having lower SBP. No significant difference was found between Group M and Group P.

There were no significant differences in MAP among the groups at various time points postoperatively, except at 300 mins post-surgery where the p-value was marginally significant (p = 0.046) as illustrated in (Figure 5).



	Baseline	1hr after oral drug	On arrival to OR	15 mins after cocktail mix	Before induction	30 mins from induction	60 mins	90 mins	120 mins	180 mins	240 mins	300 mins
Group G	82.7	83.0	85.0	84.2	83.7	83.0	84.6	87.0	86.0	86.7	86.1	83.6
Group M	83.1	83.0	85.2	84.8	84.2	82.3	84.2	87.8	86.3	89.5	90.4	86.9
Group P	81.4	82.5	83.8	84.9	84.9	82.3	84.2	87.4	86.5	86.8	86.9	83.6

Figure 5: Mean arterial pressure in the study participants

4. Discussion

The investigation focused on evaluating the effects of preemptive analgesia with oral Pregabalin (Group P), Gabapentin (Group G), and Melatonin (Group M) on perioperative outcomes in patients undergoing Robotic-assisted laparoscopic surgeries. The study provided a thorough examination of baseline characteristics, postoperative pain intensity, time to rescue analgesia, anxiety scores, Ramsay sedation scores, and various hemodynamic parameters.

The baseline characteristics of the study participants, including age, gender distribution, BMI, and ASA classifications, were well-balanced across the three groups. This suggests successful randomization and minimization of potential confounding factors, enhancing the internal validity of the study.

The results revealed significant differences in postoperative pain intensity, measured using the Visual Analog Scale (VAS), immediately upon shifting to the Post-Anesthesia Care Unit (PACU). Group G demonstrated significantly lower VAS scores compared to Group M, indicating superior pain control with Gabapentin. Similar findings were observed between Group P and both Group G and Group M. This highlights the effectiveness of preemptive analgesia in reducing immediate postoperative pain, with Gabapentin and Pregabalin exhibiting notable benefits. Our observation of significantly lower VAS scores in the Gabapentin group aligns with several studies that have demonstrated the efficacy of Gabapentinoids, including Gabapentin and Pregabalin, in reducing postoperative pain across various surgical procedures. The studies by Rorarius et al. (2008) and Mathiesen et al. (2009) provide valuable insights into the efficacy of gabapentin and a combination of pregabalin, dexamethasone, and paracetamol in postoperative pain management. Rorarius et al. found that patients who received gabapentin had significantly lower median VAS scores of 2.0 at 4 hours, 1.5 at 12 hours, and 1.0 at 24 hours postoperatively compared to the placebo group's scores of 4.0, 3.0, and 2.5, respectively. Similarly, Mathiesen et al. reported that the combination therapy resulted in mean VAS scores of 2.5 at 4 hours, 2.0 at 12 hours, and 1.5 at 24 hours postoperatively, significantly lower than the control group's scores of 5.0, 4.5, and 3.5 at the same time points. These results indicate that both gabapentin and the combination therapy are effective in reducing postoperative pain, with gabapentin and the combination therapy providing superior pain control compared to placebo and standard care.[11,12] These medications are believed to modulate pain perception by inhibiting central sensitization. Notably, a meta-analysis by Mishriky et al. concluded that preemptive use of Gabapentinoids is associated with reduced postoperative pain and opioid consumption.[13] While our findings corroborate this evidence, it's essential to note variations in dosages and surgical contexts across studies.

The time to rescue analgesia from oral drug intake significantly differed among the groups. Group G (9.48 ± 0.69) exhibited a significantly longer duration before requiring additional analgesia compared to both Group M (5.33 ± 0.46) and Group P (6.57 ± 1.06). These findings suggest that Gabapentin was associated with a delayed need for rescue analgesia, reflecting its potential to provide prolonged pain relief in the postoperative period. The prolonged time to rescue analgesia observed with Gabapentin in our study is consistent with previous research. A study by Pandey et al. in patients undergoing laparoscopic cholecystectomy found that preoperative Gabapentin significantly delayed the need for rescue analgesia.[14] Similarly, a systematic review by Verret et al. suggested that Gabapentinoids contribute to prolonged postoperative analgesia and reduced opioid requirements.[15] However, the optimal dosage and timing of administration may vary, impacting the duration of analgesic effects.

While no significant differences were observed in anxiety scores before drug intake or one hour after medication, a borderline significance was noted in the postoperative PACU period. Group G exhibited a significantly lower Ramsay sedation score compared to both Group M and Group P. This suggests that Gabapentin might be associated with lower sedation levels in the PACU, potentially allowing for a quicker recovery and reduced postoperative drowsiness. The lower Ramsay sedation scores in the Gabapentin group (1.45 ± 0.51) are intriguing and warrant

discussion in the context of patient comfort and recovery. While our findings align with studies indicating lower sedation levels with Gabapentin,[16] the impact on patient satisfaction and early mobilization should be considered. In contrast, Melatonin, a commonly used agent for its potential anxiolytic effects, did not significantly differ from Gabapentin in our study, contrary to expectations.

Analysis of heart rate, systolic blood pressure (SBP), diastolic blood pressure (DBP), and mean arterial pressure (MAP) at different time points indicated that all hemodynamics were stable stability in the three groups after surgery Notably, there were no significant differences in heart rate and DBP were observed. However, some changes in SBP were observed at postoperative minutes 240 and 300. Group G showed a lower SBP (134.1) than group M (138.4) at 240 minutes, and group P (135.3) had a higher SBP than group M at minutes 240 and 300. While these changes are statistically significant, the clinical significance may not be so high. The robust hemodynamics observed in all groups are consistent with the safety profile of these drugs in surgical settings. However, the significant differences in SBP at 240 and 300 minutes postoperatively, especially the lower SBP in the gabapentin group at 240 minutes, should be interpreted with caution Studies assessing the circulatory effects of gabapentin have been reported if the same has been observed.[17] Although this difference may not translate to clinical significance Ongoing research and individual patient evaluation is needed.

The borderline significance of MAP at 300 minutes (Group G-83.6, Group M – 86.9, Group P – 83.6) warrants postoperative attention and further investigation. Although the stability of all hemodynamic parameters suggests the safety of interventions, clinicians should exercise caution when choosing pretreatment analgesics and consider individual patient factors.

The addition of Melatonin as an experimental drug in our study showed comparable results to Pregabalin and Gabapentin in most measures such as anxiety scores, sedation, heart rate, and hypertension. This is noteworthy because melatonin is known for its anti-inflammatory properties and potential anti-anxiety properties.[18] Although neither analgesia nor sedation found a significant difference in our study, the role of melatonin in postoperative care may warrant further investigation.

The study provides valuable insight into the effects of intraoperative analgesia with pregabalin, gabapentin, and melatonin. The superior analgesia and prolonged analgesia observed with gabapentin suggest that it may be a valuable component in many analgesic approaches to robotic-assisted surgery.[19,20]

Despite extensive research on the use of gabapentinoids and melatonin for postoperative pain management, variability in dosing, surgical conditions, and patient populations limits the generalizability of findings Future research is needed various optimize drug delivery strategies, examine long-term outcomes, and these which in surgical settings beyond robot-assisted laparoscopic surgery The Gentas should be compared. Additionally, large multicenter trials that require investigation of potential interaction effects with other non-opioid analgesics and patient-specific factors such as comorbidities and genetic predispositions a its presence may enhance the robustness and applicability of the results. Examining the mechanisms of patient satisfaction, functional efficiency, and differences in pain and analgesia will lead to a more comprehensive understanding of the clinical implications Although this study provides valuable insights, its design a its location in one site and the specific surgical category may limit generalizability, emphasizing the need for broader studies in different surgical populations.

5. Conclusion

This study highlights the importance of individualized pain management and the potential benefit of gabapentin for postoperative pain in patients undergoing robotic-assisted surgery. The findings provide valuable evidence for physicians to provide optimal intraoperative care to increase patient satisfaction. Our study is consistent with existing literature supporting the use of gabapentinoids for pain management in robotic-assisted surgery. The observed differences in pain intensity, time to analgesia, and sedation provide valuable insights for clinicians. While consistent with previous evidence, the study emphasizes the importance of taking a personalized approach and considering individual patient characteristics. Further collaborative research across institutions and surgical settings will help refine strategies for improved preoperative pain relief.

6. Source of Funding

None.

7. Conflict of Interest

None.

References

1. Gupta S, Mohta A, Gottumukkala V. Opioid-free anesthesia-caution for one-size-fits-all approach. *Perioper Med (Lond)*. 2020;9:16.
2. Gams P, Danojević N, Bitenc M, Šoštarič M. Continuous erector spinae plane block as part of opioid-sparing postoperative analgesia after video-assisted thoracic surgeries:Series of 4 cases. *Indian J Anaesth*. 2020;64(6):516–9.
3. Gupta N, Kumar A, Harish RK, Jain D, Swami AC. Comparison of postoperative analgesia and opioid requirement with thoracic epidural vs. continuous rectus sheath infusion in midline incision laparotomies under general anaesthesia -A prospective randomised controlled study. *Indian J Anaesth*. 2020;64(9):750–5.
4. Degrootk I, Boeke S, Duivenvoorden HJ, Bonke B, Passchier J. Different aspects of anxiety as predictors of postoperative anxiety and

physical complaints. *Personality Individ Differ*. 1996;21(6):929–36.
5. Kavoussi R. Pregabalin: from molecule to medicine. *Eur Neuropsychopharmacol*. 2006;16(Suppl 2):128–33.
6. Naguib M, Samarkandi AH. The comparative dose-response effect of melatonin and midazolam for premedication of adult patients: a double-blinded placebo-controlled study. *Anesth Analg*. 2000;91(2):473–9.
7. D'Alonzo RC, Gan TJ, Moul JW, Albala DM, Polascik TJ, Robertson CN, et al. A retrospective comparison of anesthetic management of robot-assisted laparoscopic radical prostatectomy versus radical retropubic prostatectomy. *J Clin Anesth*. 2009;21(5):322–8.
8. Woldu SL, Weinberg AC, Bergman A, Shapiro EY, Korets R, Motamedinia P, et al. Pain and analgesic use after robot-assisted radical prostatectomy. *J Endourol*. 2014;28(5):544–8.
9. Giri S, Sarkar DK. Current status of robotic surgery. *Indian J Surg*. 2012;74(3):242–7.
10. Nasr DA, Abdellatif AA. Efficacy of preoperative melatonin versus pregabalin on perioperative anxiety and postoperative pain in gynecological surgeries. *Egypt J Anaesth*. 2014;30(1):89–93.
11. Rorarius MGF, Mennander S, Suominen P, Rintala S, Puura A, Pirhonen R, et al. Gabapentin for the prevention of postoperative pain after vaginal hysterectomy. *Pain*. 2008;138(1-2):115–20.
12. Mathiesen O, Rasmussen ML, Dierking G, Lech K, Hilsted KL, Fomsgaard JS, et al. Pregabalin and dexamethasone in combination with paracetamol for postoperative pain control after abdominal hysterectomy. A randomized clinical trial. *Acta Anaesthesiol Scand*. 2009;109(4):1281–35.
13. Mishriky BM. The effect of pregabalin on acute and chronic pain after cardiac surgery: a systematic review and meta-analysis. *J Clin Anesth*. 2015;27(3):258–74.
14. Pandey CK, Priye S, Singh S, Singh U, Singh RB, Singh PK, et al. Preemptive use of gabapentin significantly decreases postoperative pain and rescue analgesic requirements in laparoscopic cholecystectomy. *Can J Anaesth*. 2004;51(4):358–63.
15. Verret M, Lauzier F, Zarychanski R, Perron C, Savard X, Pinard AM, et al. Perioperative Use of Gabapentinoids for the Management of Postoperative Acute Pain: A Systematic Review and Meta-analysis. *Anesthesiology*. 2020;133:265–79.
16. Eipe N, Penning J, Yazdi F, Mallick R, Turner L, Ahmadzai N, et al. Perioperative use of pregabalin for acute pain-a systematic review and meta-analysis. *Pain*. 2015;156(7):1284–1300.
17. Behuliak M, Bencze M, Polgárová K, Kuneš J, Vaněčková I, Zicha J. Hemodynamic Response to Gabapentin in Conscious Spontaneously Hypertensive Rats. *Hypertension*. 2018;72(3):676–85.
18. Chaghazardi S, Hedari M, Bazargan-Hejazi S, Mohammadi R, Ahmadi A. Comparing the Effect of Gabapentin, Ketamine, Dexmedetomidine, and Entonox on Pain Control in Burn Wound Dressing. *J Burn Care Res*. 2020;41(1):151–8.
19. DeLombaert MC, Lourenço BN, Coleman AE, Arne AM, Berghaus RD, Schmiedt CW. Effect of gabapentin on ambulatory, direct, systemic arterial blood pressure in apparently healthy cats in the at-home and in-clinic environments. *J Feline Med Surg*. 2023;25(8):1098612X231188770.
20. Doleman B, Sherwin M, Lund JN, Williams JP. Gabapentin for the hemodynamic response to intubation: systematic review and meta-analysis. *Can J Anaesth*. 2016;63(9):1042–58.

Author's biography

Monica Daisy, Assistant Professor https://orcid.org/0009-0000-8643-267X

Girimurugan Nagarajan, Associate Professor https://orcid.org/0000-0003-4772-2193

Nagapriya Nagendran, Associate Professor https://orcid.org/0000-0003-4772-2193

Cite this article: Daisy M, Nagarajan G, Nagendran N. A comparison of analgesic efficacy between oral pregabalin, gabapentin, and melatonin as non-opioid anaesthesia for robotic-assisted laparoscopic surgeries: A prospective randomized double-blinded clinical study. *Indian J Clin Anaesth* 2024;11(4):511-517.