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Original Article

Effect of gabapentin on opioid requirements in patients undergoing total abdominal hysterectomy

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Abstract

Objective: To find the effect of gabapentin on opioid requirement in patients undergoing total abdominal hysterectomy.

Methodology: This experimental study was conducted at MTI Khyber Teaching Hospital, Peshawar, from June 2025 to December 2025. We included 108 individuals admitted to KTH for hysterectomy. We divided participants equally into group A and group B. Two hours before surgery, group A received 1200 milligrams of gabapentin orally, and group B received oral placebo capsules. Before surgery, each subject received a visual analog scale and was trained to assess their pain level. Supplemental opioids (nalbuphine) required before and after surgery were recorded. We also recorded individual age and weight. Both groups were given the same anesthetic technique. All patients received general anesthesia. We used the VAS score (1–10) to assess pain at 02, 08, 16, and 24 hours after surgery. We analyzed the data using SPSS version 16.

Results: A total of 108 patients participated in this study. We divided participants equally (54 in each group) into group A and group B. Gabapentin significantly reduced postoperative pain and opioid requirements. VAS scores decreased from 5.88 ± 1.36 to 0.94 ± 0.72 at 24 hours, while nalbuphine use was 12.20 ± 4.68 mg versus 23.30 ± 9.27 mg in the control group.

Conclusion: The current study demonstrated that gabapentin significantly reduces both intraoperative and postoperative pain. Furthermore, it also reduces opioid needs in patients undergoing TAH.

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Introduction

Relief from pain after a surgical procedure can minimize the risk of psychiatric and neurotic issues, thereby encouraging patients to undergo necessary surgery. A phobia of pain can be a barrier to surgery, threatening patients' wellness and quality of life. Furthermore, it can promote early ambulation for individuals[1]. Opiates are commonly used for pain relief after surgery, but their side effects such as breathing difficulties, vomiting, nausea, and intestinal ileus restrict their application. Alternative pain reducers, used separately or synergistically with opioids, can ease pain or minimize the need for them, minimizing the risk of undesirable outcomes[2]. Neuropathic pain has been treated with gabapentin, an antiepileptic and anticonvulsant drug. It is an analog of gamma-aminobutyric acid[2,3]. Several studies tested the pain-relieving effects of gabapentin using different routes of administration, dosages, and procedures, either alone or in combination with other analgesics, once or several times, before or after surgery. Almost all of the above research demonstrated that the use of the drug may decrease postop pain and the amount of analgesics used[4,5]. Moreover, it was tested together with different analgesics, including venlafaxine, COX-2 inhibitors, paracetamol, and ketamine. In cultured rat dorsal root ganglion neurons, gabapentin suppresses high-threshold calcium channel currents. It is useful in treating chronic pain disorders with minimal adverse effects[6,7]. Hysterectomy is the most frequently performed gynecological surgery, second after a cesarean section in many countries. Relieving pain after hysterectomy can support early mobility, reduce complications such as ileus, improve pulmonary function, increase patient satisfaction, reduce post-operative fatigue, and prevent delayed recovery[8,9]. The current study aimed to determine the Influence of gabapentin on opioid need in individuals undergoing total abdominal hysterectomy.

Materials and method

This experimental study was conducted at MTI Khyber Teaching Hospital, Peshawar, from June 2025 to December 2025. The institute's research committee approved the study. We included 108 patients (ASA class 1 or 2) admitted to KTH for hysterectomy. Individuals with hypertension, acid reflux disease, renal or hepatic insufficiency, coagulation problems, a history of ischemic heart disease, hypersensitivity to any medication, or those using calcium channel blockers and antidepressants were not included. We obtained written informed consent from each subject. We randomly divided participants

equally (54 in each group) into group A (experimental) and group B (control). 2 hours before surgery, group A received 1200 milligrams of gabapentin orally, and group B received oral placebo capsules. The OT monitored oxygen saturation, blood pressure, and Heart rate. Before surgery, each subject completed the VAS scale to assess their pain level. A skilled nurse not involved in any other part of the experiment placed the capsules in numbered packets and then distributed them. A blinded individual documented the pain score measurements both before the surgery (by monitoring hypertension and heartbeat associated with pain) and after surgery (VAS). Supplemental opioids (nalbuphine) required both before and after surgery were recorded. We also recorded individuals' age and weight. Both groups were given the same anesthetic technique. All individuals were given general anesthesia. Before anesthesia, each subject was given a 7.5 mg orally midazolam tablet. During induction, participants were administered thiopentone 5 mg/kg, atracurium besylate 0.5 mg/kg, and nalbuphine 0.15 mg/kg. They were ventilated for three minutes with a circular system delivering six liters of 50% O₂ in nitrous oxide, along with isoflurane (0.6%). We used a 7.5 mm ID endotracheal tube to intubate the patients. To maintain anesthesia, we used 40% O₂ in nitrous oxide and isoflurane (0.6-1.0%), reducing flows to 3 liters per minute after eight minutes. We used atracurium besylate (10 mg) for muscle relaxation. To replace lost blood volume, we used Ringer's lactate solution. We performed blood transfusions if the predicted hemoglobin level fell below 8 g/dl. Participants received nalbuphine 0.05 mg/kg at two-hour intervals for postoperative analgesia based on VAS assessment. The first post-operative dose of nalbuphine was given two hours after surgery. If pain relief was insufficient, rescue analgesia was delivered as per the procedure. VAS scores (1-10) were used for pain assessment at 02, 08, 16, and 24 hours after surgery. Scores of 1- 3 indicated mild pain, 4- 7 moderate pain, and 8- 10 severe pain. In the case of moderate pain, an intravenous dose of 0.05 mg/kg of nalbuphine was given and recorded. The data were analyzed using SPSS version 16. To assess pain scores and supplemental nalbuphine requirements, Student's t-test was used. A p-value of < 0.05 was considered significant.

Results

A total of 108 patients participated in this study. The study participants were randomly divided equally (54 in each group) into group A (experimental) and group B (control). Group A received 1200 milligrams of gabapentin orally, and group B received oral placebo

capsules. The mean age of the study population was 46 ± 1.21 years (range 42-62 years), and the mean weight was 78 ± 4.11 kilograms, as shown in Table 1. Both groups had similar hemodynamic findings. There was no requirement for intraoperative rescue analgesics in any group. VAS score after the surgical procedure at 0, 2, 8, 16, and 24 hours in the gabapentin group was significantly lower compared to the control group. At 0 hours, the study group had a mean VAS score of 5.88 ± 1.36 , and the control group had 9.02 ± 1.22 . After 24 hours, it was 0.941 ± 0.72 in the gabapentin group and 3.326 ± 1.10 in the control group, as presented in Table 2. The gabapentin group had a significantly smaller quantity than the nalbuphine group in the first twenty-four hours after surgery. The control group used 23.30 ± 9.270 mg, and the study group required 12.20 ± 4.680 mg nalbuphine; the difference was significant ($p < 0.001$), as shown in Table 3.

Table 1. Demographic features of the study population

Group	Frequency
Group A	54
Group B	54
Total	108
Characteristics	Mean ($\pm$ SD)
Age in years	46 ± 1.21 years
Weight in Kg	78 ± 4.11

Table 2. Assessment of VAS Pain Scores (In centimeters) after surgical procedure in both groups

Time in hours	Group	Mean $\pm$ SD	Value of P
zero	Group A	5.88 ± 1.36	0.000
24 hours	Group B	9.02 ± 1.22	
Time 2	Group A	3.352 ± 0.778	0.000
2hours	Group B	5.971 ± 1.201	
Time 8	A group	2.617 ± 1.337	0.000
8 hours	B group	4.200 ± 1.052	
Time 16	A group	2.088 ± 0.861	0.000
16 hours	B group	4.028 ± 1.172	
Time 24	Group A	0.941 ± 0.72	0.000
At 24 hours	Group B	3.326 ± 1.10	

Table 3. Nalbuphine consumption (in milligrams) after surgery

Group	No of individuals	Mean ($\pm$ SD)	P value (Student's t-test)
Study group	54	12.20 ± 4.680	0.000
Control group	54	23.30 ± 9.270	

Discussion

Postoperative pain impacts recovery following surgery and anesthesia. Opioids are extensively used for pain relief; however, their accompanying problems restrict their effectiveness. Combination therapies of opioid and nonopioid medications are intended to enhance the benefits of opioids while reducing problems. Gabapentin is an anticonvulsant that operates on voltage-dependent calcium channels[10]. This medicine induces the release of amino acids in the spinal cord, reducing or alleviating activity in damaged nerves. These drugs can therefore be prescribed to manage persistent pain, such as diabetic neuropathy, herpetic neuralgia, and other neuropathic illnesses[11]. Gabapentin has been studied for its efficacy in reducing pain after surgical procedures and stopping brain impulsiveness.¹¹ The current study was conducted to evaluate the impact of gabapentin on the opioid need in people following complete abdominal hysterectomy[12]. Our study demonstrated that a 1200 mg dose of gabapentin given 2 hours prior to operation significantly reduces the requirement for opioids after the procedure over the 1st 24 hours. Individuals who received gabapentin reported lower pain scores (VAS) than those in the control group. These findings are similar to the study conducted by Frouzanfar[9]. Our study revealed that gabapentin minimized the need for opioids in individuals undergoing TAH. Postoperative wounds and operative drains during the operation are sources of pain. After the surgical procedure, when pain is high on the first day, pain management is vital. Several painkillers have been used, and a mix of non-opioid and opioid agents has resulted in effective postoperative pain control[13]. Overuse of opioids can induce harmful outcomes such as respiratory issues. In contrast, gabapentin taken to prevent pain has been found to minimize the overall amount of opioids needed in surgical patients, thereby minimizing the likelihood of adverse effects.¹³ Gozal et al[14] discovered that persons undergoing thyroid gland surgery had considerably decreased opioid requirements following local wound infiltration with bupivacaine(0.5%) prior to skin

closure, which supports our results. Basto et al. [15] observed that during operation, ketoprofen and paracetamol usage was associated with lessened pain and a reduction in the requirement for morphine after thyroid and parathyroid surgery [15]. Preventative painkilling with paracetamol has been tried in a study, with different amounts of success. Another study found that after thyroid surgery, bilateral superficial blocks significantly reduced pain intensity. Aunac et al. [16,17] showed that bilateral superficial and deep cervical blocks performed before thyroid surgery greatly reduced pain and the need for anesthesia during the procedure [18]. Though the standard prescription for treating neuropathic pain is 300-1200 mg three times a day, the gabapentin dosage used in our study (1200 mg) was comparable.¹⁸ Two hours before surgery in this experiment, gabapentin was given orally because laboratory animal studies have demonstrated that anticipatory gabapentin treatment is more successful and more durable than post-treatment. In a rodent model of postoperative pain, preventive treatment with a single dose of gabapentin delayed the development of hyperalgesia for two days, whereas gabapentin provided an hour after the surgery only relieved symptoms for three hours[19]. Previous clinical trials of gabapentin for postoperative pain have had positive results. Gabapentin 1200 mg, administered orally one hour before surgery, lowered postoperative morphine consumption and pain ratings in the early postoperative phase for those undergoing spine surgery, reducing opioid-related side effects such as nausea and vomiting. In another study, Gabapentin 3000 mg administered before and throughout the first 24 hours after a total abdominal hysterectomy led to a 32% decrease in morphine intake, with no detectable influence on pain ratings during movement or at rest [20,21]. Our trial participants tolerated gabapentin well, and no significant side effects were seen while taking oral gabapentin prior to surgery. Our results are comparable to previously published research [23].

Conclusion

The study demonstrated that gabapentin significantly reduces intraoperative and postoperative pain. It also reduces opioid needs in patients undergoing TAH.

Ethical Approval

The Institutional Review Board/Ethics Committee approved this study before it began. **Approval no (MTI/KTH/456/08/2024)**

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This study received no external funding. The research used available institutional resources.

Conflict of Interest

The authors declare that they have no competing interests or conflicts of interest related to this study.

Authors' Contributions

Ambareen Sifatullah: Conceptualization, study design, supervision, data interpretation, manuscript drafting, critical revision, final approval, and accountability for all aspects of the work.

Muhammad Javed Khan: Methodology, data collection, data curation, statistical analysis, data interpretation, manuscript drafting and revision, final approval, and accountability for all aspects of the work.

Shahid Maqsood: Study supervision, methodology, interpretation of findings, critical review of the manuscript, final approval, and accountability for all aspects of the work.

Fazal Wadood: Data collection, literature review, data curation, manuscript revision, final approval, and accountability for all aspects of the work.

Parhaizgar Khan: Data analysis, literature review, manuscript drafting and revision, interpretation of findings, final approval, and accountability for all aspects of the work.

Umbrin Naz: Study supervision, critical review of the manuscript, interpretation of findings, final approval, and accountability for all aspects of the work.

All authors: Reviewed and approved the final version of the manuscript and agreed to be accountable for all aspects of the work in accordance with ICMJE authorship criteria.

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