Original Article

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Gabapentin as Pre-Emptive Analgesic Agent Given To Abdominal Hysterectomy Patients for Post-Operative Analgesia

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Abstract

Background: Pain after hysterectomy is often multifactorial from various causes. Pain occurs from the incision site, deeper visceral systems, and pain in action, such as through straining, coughing, or mobilisation, which can be serious. The objective is to evaluate whether Gabapentin when given orally preoperatively at a dose of 300 mg affects postoperative pain and analgesic requirements in patients undergoing total abdominal hysterectomy under spinal anaesthesia. **Subjects and Methods:** This is a prospective, randomised, double-blind, placebo-controlled sample. This research was performed on a total of 60 patients who underwent an elective abdominal hysterectomy at our institute. Patients were randomly assigned to two groups: Group G (Gabapentin Group) and Group P (Placebo Group). Group G patients received Gabapentin 300 mg orally and Group P patients received placebo capsules with sips of water two hours before the operation. Period from spinal anaesthesia to the first analgesic (T) requirement, a complete analgesic requirement in the first 24 hours, visual analogue scale (VAS) rest and activity ratings, Ramsay sedation score, drug side effects such as somnolence, dizziness, confusion, nausea, vomiting were reported in 0,2,4,6,12 hours postoperatively. **Results:** When administered preoperatively, a single oral dose of Gabapentin 300 mg lowers postoperative pain and overall tramadol intake in the abdominal anaesthesia patients. For Gabapentin usage, sedation was the most important side effect. Gabapentin should also be used as a supplement for the management of postoperative pain. **Conclusion:** This study shows that a single oral dosage of 300mg of gabapentin as pre-operatively administered decreases the post-operative discomfort and overall utilisation of tramadol in abdominal hysterectomy patients with spinal anaesthesia.

Keywords: Gabapentin, Hysterectomy, Pain, Preemptive Analgesia

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Introduction

One of the worst medical problems is postoperative pain. The International Pain Research Association describes the pain as a ”sensory and emotional unpleasant sensation correlated or described with tissue injuries.”[1] Surgical pain mechanism Post-operative pain is caused by:

1. Inflammation from tissue trauma caused by surgical incision, dissection of tissues, and burns due to the use of cautery and
2. Direct nerve damage is caused by transecting, stretching, or compressing the nerves. Tissue trauma allows local inflammatory mediators to be published. Producing heightened exposure to stimuli in the region around the injury (i.e. hyperalgesia) or inducing misperception of pain due to non-noxious stimuli (i.e. Allodynia).

Pain after hysterectomy is often multifactorial from various causes. Pain occurs from the incision site, deeper visceral systems, and pain in action, such as through straining, coughing, or mobilisation, which can be serious. The abdominal operation is more invasive than the vaginal procedure which induces more discomfort. Proper postoperative pain relief leads to early mobilisation or brief hospital visits, reduced hospital rates, and improved patient satisfaction. Pain management regimens must be adjusted to the needs of particular patients, taking into account their age, medical history, physical condition, level of anxiety, surgical technique, and exposure to administered agents.[2]

Acute Effects of Postoperative Pain:

The emotional and physical suffering of sleep disorder in patients. The respiratory system decreases lung volumes, pecu-

liar cough, sputum retention, inflammation, atelectasis. Cardiovascular system: tachycardia, hypertension, increased consumption of oxygen, myocardial ischemia, thrombosis of the deep veins. Gastrointestinal System: Reduces motility of the intestines. Genitourinary System: Retention of urine. Endocrine System: increases catabolic hormones, increases blood glucose, causes retention of sodium and water Central nervous system: anxiety Immunological impairment, infection, delayed healing of wounds.[3]

Chronic effects of postoperative pain:

- The factor of risk for chronic pain development.
- Vulnerability primarily in children from behavioral changes.
- Long-term recovery delay

Goals of postoperative pain management:

- Limit physiological pain-induced stress response.
- Maximizing the rehabilitation of patients and reducing study time.
- Minimizing chronic pain syndrome progression in conjunction with surgery.

The key aim of postoperative treatment of pain is to decrease the dosage of drugs, to reduce side effects and to offer sufficient analgesia. Multimodal approaches to pain management can achieve this.

Subjects and Methods

Study Design: This is a prospective, double-blind, randomised, placebo-controlled sample. This research was performed in patients undergoing elective abdominal hysterectomy.

Sample Size: After the consent of the Institutional Ethics Committee, 60 patients meeting the inclusion criteria were randomly assigned to two groups. 1. 30 patients in the Gabapentin group (G-group) 2. 30 patients in group Placebo (group P). Gabapentin 300 mg was administered orally in Group G and placebo capsules were administered to Group P patients with water two hours before surgery.

Inclusion Criteria

- Patients I and II with ASA physical state
- 30-60-year age group
- Elective abdominal hysterectomy posted patients

Exclusion Criteria

- Known gabapentin exposure
- Epilepsy condition history
- Recognized mental disorder
- Pain syndromes chronic
- Kidney failure or liver
- Drug misuse past
- Recent analgesics have been removed from the sample in the last 24 hours.

Monitors (ECG, NIBP, pulse oximetry) were attached inside the operating room and specific parameters were monitored and recorded. The catheterized bladder was used to monitor the output of urine. Intravenous access with cannula 18G was established. With a solution of 10ml/kg Ringer, all patients had been preloaded. 3ml of the 0.5% hyperbaric fluid in a lumbar subarachnoid position in the right lateral position after this patient has been placed in a supine position, according to stringent aseptic safeguards. Electrocardiography, blood pressure, heart rate (HR), peripheral saturation of oxygen (SPO2), intraoperatively constant, was monitored and recorded.

At the end of the operation, patients were transferred to the ward. VAS ratings at rest and activity were assessed during the immediate postoperative duration of 0, 2, 4, 6 and 12 hours postoperatively. If the VAS score was 4 or higher, Inj. Tramadol 2mg/kg was delivered intravenously to patients. During 24 hours of overall analgesic demand, findings of VAS were recorded in the first 12 hours after surgery, Ramsay sedation rating, side effects, dizziness, confusion, nausea, vomiting Period after the first analgesic requirement for spinal anaesthesia (T) Time after spinal anaesthesia. Statistical analysis has been carried out using the SPSS24 software. Descriptive statistics (mean standard deviation) and a frequency table were used to define the basic characteristics of both classes. The group study was conducted using the Independent student 't' test and the Pearson chi-square test.

Results

Nausea was reported in 13% of patients in Group G and in 16 percent of patients in Group P. Vomiting occurred in 7% of patients in each group. Dizziness was reported in 3% of patients in Group G and none experienced dizziness in Group P.

The mean weight of patients in group G was found to be 58.27+ 5.25 kg. Patients in group P were found to have a mean weight of 56.57+ 4.96 kg. The P-value calculated was 0.202, which is not significant. This indicates that both groups are comparable in terms of weight. Group G patients had a mean height of 155.87 +3.88 cms. Patients in group P were found to have a mean height of 156.30 +6.23cms. So, both groups are comparable in terms of height.

The mean surgery duration was 102.50 +14.67 minutes in Group G patients. The average surgical time in Group P patients was 109 +17.68 min. There is also no variation in the length of the operation between classes.

Table 1: Distribution based on Age and complications

Age Distribution	Group G		Group P	
	Number of Patients	Percentage	Number of Patients	Percentage
30-40	4	13%	5	17%
41-50	21	70%	18	60%
51-60	5	17%	7	23.33%
Complications				
Nausea	4	13%	5	16%
Vomiting	2	7%	2	7%
Dizziness	1	3%	-	-

Table 2: Mean of Weight, Height, and Duration of Surgery, T1 score and Tramadol dose among both the groups

Groups	N	Mean + SD	P-value
Weight			
Group G	30	58.27+5.25	0.202
Group P	30	56.57+4.96	
Height			
Group G	30	155.87+3.88	0.748
Group P	30	156.30+6.23	
Duration of Surgery			
Group G	30	102.5+14.67	0.127
Group P	30	109+17.68	
T1 Score Anaesthesia			
Group G	30	183.00+19.81	0.013
Group P	30	172.33+11.50	
Tramadol dose			
Group G	30	221.33+40.32	<0.0001
Group P	30	289.00+21.31	

Both patients were tested for VAS scores regularly after surgery. The patients received Tramadol at an initial dosage of 2mg/kg intravenously while the VAS score remained at 4 or greater. T1 is also the time interval from the first injection of tramadol to the delivery of spinal anaesthesia. This was 183.0min in G Group and 172.33min in G Group. This time was observed.

The P-value, considered to be important, was estimated to be 0.013. The score for T1 in Group G is therefore much higher than Group P.

Postoperative analgesia has been prescribed with intravenous tramadol to all patients. The initial dose of tramadol is 2 mg/kg intravenously when the VAS score is 4 or higher. Subsequently, tramadol was given at a dose of 1 mg/kg when the VAS score was 4 or more or when requested by the patient. Treatment does not exceed 250 mg/dose and 600 mg/day. The average dosage of Tramadol administered for each patient over the postoperative duration was projected to be up to 24 hours. The mean dose of tramadol needed in patients in group G was 221.33 mg and the required dose in group P was 289.00 mg. As a result, average tramadol consumption was found to be significantly lower in group G patients compared to group P.

In all groups (Group G & Group P), 24 patients in each group were ASA PS-I and 6 patients in each group were ASA PS-II. P was found to be greater than 0.05, so the significance is not important. Patients in both groups were also similar in the ASA PS grouping.

In the immediate postoperative period (0 hours), both patients were monitored for resting VAS ratings, 2, 4, 6 and 12 hours postoperatively. The residual VAS rating was observed in both Group G and Group P during the immediate postoperative time of 0 hr). This is attributed to the effects of spinal anaesthesia. In Group G, mean VAS residue values for 2, 4, 6 and 12-hour postoperative periods were 3.67, 3.13, 2.90, 2.27, and in Group

Table 3: ASA PS Classification

Group	ASA		P-value
	I	II	
Group G	24	6	1.000
Group P	24	6	

Table 4: VAS Score at Rest and Movement

Rest	Groups	n	Mean+ SD	P-value	Mean+ SD	P-value
0 hour	Group G	30	1.00+0.00	n/a	1.10+0.31	0.001
	Group P	30	1.00+0.00		1.47+0.51	
2 hours	Group G	30	3.67+0.88	<0.0001	4.93+0.98	0.006
	Group P	30	4.63+1.10		5.67+1.03	
4 hours	Group G	30	3.13+0.43	<0.0001	4.20+0.48	<0.0001
	Group P	30	3.73+0.69		4.83+0.70	
6 hours	Group G	30	2.90+0.55	<0.0001	3.96+0.61	<0.0001
	Group P	30	3.60+0.77		4.71+0.74	
12 hours	Group G	30	2.27+0.52	<0.0001	3.27+0.52	<0.0001
	Group P	30	3.27+0.52		4.30+0.53	

P patients, mean VAS residue values were 4.63, 3.73, 3.60 and 3.27, respectively. The P values for both times were less than 0.05. The P-value at all times was less than 0.05. This means that the mean category G VAS ranking for patients is slightly lower.

Patients were checked with VAS activity ratings by sitting patients. Score mean movement was 1.10, 4.93, 4.20, 3.26, and mean 1.47, 5.67, 4.83, 4.71, and 4.30 in the P-group respectively. Ratings of 0, 2, 4, 6, 12 hours postoperatively. The P-value was still below 0.05. The overall VAS scores for Group G participants were marginally less in all stages than for Group P.

All patients with the Ramsay sedation score were evaluated at a time of 0, 2, 4, 6 and 12 hours after the procedure for the sedation level. Average post-operatively sedation ratings of 0, 2, 4, 6 and 12 hours in Group G and group P respectively of 2.93, 2.30, 2.20, 2.30 and 2.57 were 2.27, 2.07, 2.00, 2.07 and 2.13. The value of P was less than 0.05 at every time interval. This indicates that in group G patients the level of sedation was considerably higher than in group P.

All patients were monitored periodically for symptoms during the post-operative phase. Out of 30 patients in both groups, 24 patients did not develop any complications.

Discussion

The most promising treatment option is a multimodal approach to postoperative pain relief. Many clinical tests have demonstrated the role of anticonvulsants in the treatment of acute postoperative pain. This study explored whether gabapentin, preoperatively administered, plays a part in the relief of acute postoperative pain. The results of the study demonstrate that gabapentin 300 mg given two hours before the treatment significantly decreases postoperative pain, an analgesic state, and improves the length of the first analgesic dose without an elevated frequency of side effects other than sedation. Gabapentin 300mg was administered orally two hours before an operation since it hits peak plasma levels two to three hours after oral intake. In a Gidal BE et al,[4] research the drug was found to cross the blood-brain barrier readily and to almost equal its concentration in the brain. Gabapentin is thereby protected from peripheral and centralised sensitization by reducing the hyperalgesia and allodynic linked to surgical handling at the maximum concentration in the plasma and brain tissue during surgical incision.

For this analysis, a 300mg gabapentin dosage was chosen as its oral bioavailability is 60 percent and with increased doses decreases. In the case of patients with laparoscopic cholecystectomy and Panah Khahi in patients with orthopedic operations under spinal anaesthesia, a comparable dosage of 300mg was used for the research performed by C.K.Pandey et al.[5,6]

In Elina M's analysis. Tiippana et al,[7] have been shown to decrease opioid use by 20 – 60 percent at a dosage of gaboventin of 300 – 1200 mg preoperatively. The dosage of gabapentin used also did not affect opioid intake, which is consistent with my research.

Table 5: Ramsay Sedation Score

Ramsay Scores	Sedation	Group	N	Mean+ SD	P-value
0 hour		Group G	30	2.93+0.25	<0.0001
		Group P	30	2.27+0.45	
2 hours		Group G	30	2.30+0.47	0.019
		Group P	30	2.07+0.25	
4 hours		Group G	30	2.20+0.41	0.009
		Group P	30	2.00+0.00	
6 hours		Group G	30	2.30+0.47	0.019
		Group P	30	2.07+0.25	
12 hours		Group G	30	2.57+0.50	<0.0001
		Group P	30	2.13+0.35	

Table 6: ?

Group	Complications		P-value
	No	Yes	
Group G	24	6	1.000
Group P	24	6	

In a post-operative analysis performed by Elina M. Tiippana et al,[7] the VAS ratings for rest and motion in the gabapentin community were substantially lower (P-value <.05) compared with placebo in the 0, 2, 4, 6 and 12-hour span of time. In our study, the VAS scores were found slightly lower in the gabapentin group than in the placebo group in resting and activity.

Across the Dirks et al,[8] research patients that underwent gabapentin, a drop in the pain scores occurred while stroke, but not for rest while exercising. At the 2^{nd} hour, mean resting scores were 33mm vs. 19mm (P 0.094 values) for Group P vs. Group G and 12mm vs. 7mm (P =.084) for 4 hours. However VAS values were 41mm vs 22mm (P value<0.0001) and 31mm vs 9mm (p value=0.018) at the motions of P vs Group G at the 2nd hour, and were seen to be important in line with my analysis.

Gabapentin developed slightly lower VAS values at rest and activity at 1, 4, 8, 12, 16, 20 and 24 hours during the research conducted by A. Turan et al. in patients undergoing abdominal hysterectomy.[9]

Gabapentin is known to be a useful medication for the perioperative cycle, according to the research carried out by Dahl et al.[10]

Conclusion

This study shows that a single oral dosage of 300mg of gabapentin as pre-operatively administered decreases the post-operative discomfort and overall utilisation of tramadol in abdominal hysterectomy patients with spinal anaesthesia.

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