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Original Research Article

The effect of magnesium sulfate [MG-Sulfate] infusion in the operating room on analgesia after hysterectomy in women with cancer

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ABSTRACT

Introduction: Magnesium sulfate[MG-Sulfate] acts as a calcium channel blocker and NMDA receptor antagonist. When the magnesium ions are separated from the NMDA receptors, the pain sensation process begins. After major surgery, with the onset of acute pain, clinical use of magnesium can reduce postoperative pain by blocking the central sensation of pain by blocking NMDA receptors. The aim of this study was to evaluate the effect of MG-Sulfate infusion in the operating room on analgesia after hysterectomy in women with cancer. **Material and Methods:** In this prospective cross-sectional study, 40 candidates for hysterectomy [due to cancer] were evaluated. Magnesium group [M] 50 mg / kg IV MG-Sulfate in 100 cc normal saline 0.9% and control group [C] 100 cc normal saline 0.9% after intubation and their pain intensity was measured by VAS. Finally, a comparison was made between the two groups. **Results:** There is no statistically significant change in the amount of pain at rest between the two groups [p-value=0.925] and it can be said that the two drugs did not have different effects. The mean amount of pain changes in cough condition was examined using repeated measures analysis of variance, which showed that the age variable had no statistically significant effect on changes in pain during cough [p-value = 0.925].**Conclusion:** Administration of MG-Sulfate at a dose of 50 mg / kg has no effect on pain intensity and drug dose after hysterectomy [due to cancer] and also changes systolic and diastolic blood pressure and arterial blood oxygen saturation during and after surgery. This does not apply to the control group and only causes a significant increase in heart rate compared to the control group at the end of the operation.

Keywords: Magnesium Sulfate, Hysterectomy, Pain, Cancer

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Introduction

Some postoperative analgesia techniques include the use of opioids in a variety of ways, including patient-controlled analgesia [PCA] intravenously or epidurally [1, 2], the use of nonsteroidal anti-inflammatory drugs [NSAIDS], Epidural analgesia and the use of antidepressants and anticonvulsants [3, 4]. The role of MG-Sulfate in causing analgesia is known for its effect in inhibiting NMDA receptors [5]. NMDA receptors play an important role in transmitting pain sensation in the central and peripheral nervous system and causing acute pain in the body, so it is also effective in feeling severe pain after surgery [6, 7]. MG-Sulfate acts as a calcium channel blocker and NMDA receptor antagonist. When the magnesium ions are separated from the NMDA receptors, the pain sensation process begins. After major surgery, with the onset of acute pain, clinical use of magnesium can reduce postoperative pain by blocking the central sensation of pain by blocking NMDA receptors [8]. The aim of this study was to evaluate the effect of MG-Sulfate infusion in the operating room on analgesia after hysterectomy in women with cancer.

Material and Methods

In this descriptive cross-sectional and prospective study, 40 hysterectomy patients who presented with ASA class II, I in the age range of 30-60 years without a previous history of hysterectomy were hospitalized. After obtaining written consent, they were randomly divided into two groups. All patients underwent surgery for cancer and the main criterion for this study was. Magnesium group [M] received 50 mg / kg of MG-Sulfate IV in 100 cc normal saline 0.9% and control group [C] 100 cc normal saline 0.9% after intubation. The general anesthesia technique was the same in all patients. They did not receive any prodrugs. Induction of anesthesia was started with µg / kg 3 fentanyl and propofol 2 mg / kg. Atracurium 0.6 mg / kg was used for intubation. For maintenance of anesthesia, O2, N2O in a ratio of 50 to 50 and propofol infusion of 100 min / µg / kg were used. Arterial BP, HR and SPO2 were monitored before the start of MG-Sulfate or normal saline infusion, 15 minutes after the start of the infusion and at the end of the operation [after stopping the infusion].

The amount of pain at rest and when coughing using VAS [Visual Analogue Scale] at 6 and 12 hours after anesthesia and also the dose of drug used in recovery, at 0 to 6 and 7 to 12 hours after anesthesia And recorded in a questionnaire. Patients did not receive any other analgesic drugs. After collecting information, the dose of narcotics used and the VAS index in the mentioned hours were compared between the two groups and statistically analyzed. This study was performed after obtaining the code of ethics from Tabriz University of Medical Sciences. Appropriate tests such as T test, Fisher's Exact Test, Kolmogorov-Smirnov, Mann-Whitney U and repeated measures analysis of variance were used to analyze the data. The normality of the data was investigated using a one-sample Klomogorov-Smirnov test. And if the data are not normal, Mann-Whitney U test have been used. The software used in this study is SPSS 21 and the significance level of the tests is less than 5%.

Results

The mean of changes in pain at rest was analyzed using analysis of variance with repeated measures. It was found that the age variable had no statistically significant effect on changes in pain at rest [p-value=0.417]. There is no statistically significant change in the amount of pain at rest between the two groups [p-value=0.925] and it can be said that the two drugs did not have different effects.

Table 1: Comparison of pain intensity between different groups participating in the study based on age

Multivariate Tests[a]						
Sig.	Error df	Hypothesis df	F	Value	Effect	
0/678	35/001	1/ 001	0/125[b]	0/003	PT	The rate of change of pain at rest
0/678	35/001	1/001	0/125[b]	0/905	WL	
0/678	35/001	1/001	0/125[b]	0/015	HT	
0/678	35/001	1/001	0/125[b]	0/015	RLR	
0/925	35/001	1/ 001	0/019[b]	0/001	PT	The rate of change of pain at rest[Groups]
0/925	35/001	1/001	0/019[b]	1/101	WL	
0/925	35/001	1/001	0/019[b]	.0/002	HT	
0/925	35/001	1/001	0/019[b]	0/002	RLR	
0/417	35/001	1/ 001	0/635[b]	0/008	PT	The rate of change of pain at rest [Age]
0/417	35/001	1/001	0/635[b]	0/981	WL	
0/417	35/001	1/001	0/635[b]	0/018	HT	

0/417	35/001	1/001	0/635[b]	0/018	RLR	
0/818	35/001	1/ 001	0/044[b]	0/001	PT	The rate of change of pain at rest [Age+ Groups]
0/818	36/000	1/000	0/054[b]	0/999	WL	
0/818	36/000	1/000	0/054[b]	0/001	HT	
0/818	36/000	1/000	0/054[b]	0/001	RLR	

PT: Pillai's Trace- WL: Wilks' Lambda - HT: Hotelling's Trace - RLR: Roy's Largest Root

The mean amount of pain changes in cough condition was examined using repeated measures analysis of variance, which showed that the age variable had no statistically significant effect on changes in pain during cough [p-value = 0.925]. Also, there is no statistically significant difference in changes in the amount of pain in cough between the two groups [p-value = 0.529] and it can be said that the two drugs did not have different effects.

Table2: Comparison of cough pain by group and age

Multivariate Tests[b]						
Sig.	Error df	Hypothesis df	F	Value	Effect	
0/725	36/000	1/ 000	0/126[a]	0/ 003	PT	The degree of change in pain in cough
0/725	36/000	1/000	0/ 126[a]	0/997	WL	
0/725	36/000	1/000	0/126[a]	0/004	HT	
0/725	36/000	1/000	0/126[a]	0/004	RLR	
0/529	36/000	1/ 000	0/404[a]	0/011	PT	The degree of change in pain in cough [Groups]
0/529	36/000	1/000	0/404[a]	0/989	WL	
0/529	36/000	1/000	0/404[a]	0/011	HT	
0/529	36/000	1/000	0/404[a]	0/011	RLR	
0/925	36/000	1/ 000	0/.009[a]	0/000	PT	The degree of change in pain in cough [Age]
0/925	36/000	1/000	0/ 009[a]	1/000	WL	
0/925	36/000	1/000	0/009[a]	0 / 000	HT	
0/.925	36/000	1/000	0/009[a]	0/000	RLR	
0/519	36/000	1/ 000	0/425[a]	0/012	PT	The degree of change in pain in cough [Age + Groups]
0/519	36/000	1/000	0/425[a]	0/988	WL	
0/519	36/000	1/000	0/425[a]	0/012	HT	
0/519	36/000	1/000	0/425[a]	0/012	RLR	

The mean changes of DBP were analyzed using repeated measures analysis of variance, which generally shows significant changes in DBP [p-value = 0.037]. Also, there is no statistically significant difference in the rate of changes in DBP between the two groups [p-value = 0.118] and it can be said that the two drugs did not have different effects. Repetitive tests were performed in which no significant changes were observed in the rate of changes in heart rate per minute [p-value = 0.51]. Also, there is no statistically significant difference in the rate of change in heart rate per minute between the two groups [p-value = 0.125] and it can be said that the two drugs did not have different effects. It was examined with repeated measures that in general, significant changes are observed in the rate of changes in arterial blood oxygen saturation [p-value = 0.006]. Also, there is no statistically significant difference in the rate of changes in arterial blood oxygen saturation between the two groups [p-value = 0.885] and it can be said that the two drugs did not have different effects.

Discussion

In our study, the age distribution of patients was as follows: in the group of MG-Sulfate, the minimum age was 30 years and the maximum age was 60 years and the mean age of patients in this group was 45.8 ±10.9. In the normal saline group, the minimum and maximum ages were 30 and 60 years, respectively, and the mean age in this group was 46.1 ±10.5. In total, the patients were in the age range of 30 to 60 years with a mean age of 45.9±10.6. There was no significant difference between the two groups in terms of age in the study[9 , 10]. The sex distribution of patients in our study was such that each of the two groups consisted of 17 women and 3 men with a ratio of 85% to 15% and in Of the total 40 patients studied, 85% [n=34] were female and 15% [n=6] were male. In our study, there was no significant difference between the two groups sexually [11]. A similar study examining the effect of MG-Sulfate injection around the operation site for laparoscopic analgesia for gallbladder resection in 83 patients found that pain scores in the MG-Sulfate -tramadol group were significantly lower than in the tramadol group. It was at 0, 4 and 12 hours after surgery and this study finally concluded that 50 mg/kg injection of MG-Sulfate during surgery is effective in reducing postoperative pain in laparoscopic cholecystectomy patients [12 , 13]. Several studies examining the effect of intra-articular injection of MG-Sulfate for analgesia after knee arthroscopic surgery in 60 patients concluded

that intra-articular injection of MG-Sulfate significantly reduced the pain scores of MG-Sulfate compared to the normal group. Saline is administered at 1, 2, 6 and 8 hours after the operation. The mean pain scores according to VAS in the MG-Sulfate group in the above hours were 1.7 ± 0.5, 2.2 ± 0.6, 2.8 ± 1.01 and 3.5 ±1.1, respectively, and the mean scores were Pain according to VAS in normal saline group in the above hours were 8 ± 1.2, 5.9 ±1.1, 4.4 ± 0.6 and 4.5 ±1.1, respectively. This study eventually concluded that intra-articular injection of MG-Sulfate is effective for analgesia after arthroscopic knee surgery [14 , 15]. The researchers studied the analgesia caused by bupivacaine alone and bupivacaine with MG-Sulfate intraperitoneally and their effect on pain relief after laparoscopic cholecystectomy in 60 patients and concluded that patients Those who received bupivacaine with MG-Sulfate intraperitoneally at the end of surgery had more pain relief in the first 24 hours after surgery than the bupivacaine group [VAS pain scores in the bupivacaine- MG-Sulfate group were 0-5]. Was compared with the pain scores of the bupivacaine group. The study concluded that the use of a combination of bupivacaine with MG-Sulfate intraperitoneally at the end of laparoscopic cholecystectomy resulted in better pain control than the bupivacaine group [16, 17]. Another study examining the effects of MG-Sulfate on analgesia and reducing the need for narcotic analgesics after cholecystectomy found that pain at 6 and 12 hours postoperatively was lower in the group receiving MG-Sulfate than in the group. Was a witness. [P <0.05] but at 18 and 24 hours after surgery there was no difference between the two groups. The final result of this study showed the effect of MG-Sulfate in reducing pain after cholecystectomy [18]. In our study, different results were obtained in comparison with the above studies, so that the mean rate of pain changes between the two groups at rest and cough were examined using analysis of variance with repeated measures, which is generally a significant difference. The mean pain at rest or cough, 6 and 12 hours after anesthesia, was not present between the two groups of MG-Sulfate and normal saline [p-value <0.05], ie MG-Sulfate in reducing pain after laparoscopic bag surgery. Bile did not have a different effect compared to normal saline. Probably because the above studies confirmed the effect of MG-Sulfate on postoperative analgesia, the study of patients' pain by those studies more often and in times before 6 Or after 12 hours after anesthesia, while in our study, patients' pain was assessed only at two times, ie 6 and 12 hours after anesthesia, and finally it should be said that the reason for the lack of effect of MG-Sulfate on postoperative pain The practice in our study needs further investigation [19, 20]. In a similar study that examined the effect of

intravenous MG-Sulfate before induction of anesthesia on pain after inguinal hernia repair surgery in 105 patients, it was found that in the group receiving 50 mg / kg MG-Sulfate, the amount of VAS at the time of discharge Recovery with a mean of 5.5 was significantly different from the control group with an average of 8.1 and the group receiving 25 mg / kg MG-Sulfate with an average of 7.2. but VAS at 6, 12 and 24 hours after discharge from recovery was not significantly different between the three groups. The general conclusion was that the administration of intravenous MG-Sulfate at a dose of 25 mg / kg and 50 mg / kg, had an effect on severity Patients do not have pain after inguinal hernia repair [21].

Conclusion

Administration of MG-Sulfate at a dose of 50 mg / kg has no effect on pain intensity and drug dose after hysterectomy [due to cancer] and also changes systolic and DBP and arterial blood oxygen saturation during and after surgery. This does not apply to the control group and only causes a significant increase in heart rate compared to the control group at the end of the operation.

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