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Original Research Article

Experience of Using Magnesium Sulfate Infusion in the Operating Room to Induce Analgesia after Laparoscopic Cholecystectomy

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ABSTRACT

Introduction: The aim of the present study was the experience of using magnesium sulfate infusion in the operating room to induce analgesia after laparoscopic cholecystectomy. **Material and Methods:** This study was conducted as a clinical experiment in 2018 with the participation of 40 patients who were candidates for laparoscopic cholecystectomy. Magnesium group [M] received 50 mg/kg of magnesium sulfate IV in 100 cc normal saline 0.9% and control group [C] 100 cc normal saline 0.9% after intubation. Intensity was then measured at different times. Pain intensity was measured and compared between the two groups in different situations. **Results:** There was no statistically significant difference in changes 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. Repeated measures were examined and it was found that the age variable did not have a statistically significant effect on changes in the amount of pain in cough [p-value=0.925]. **Conclusion:** Administration of magnesium sulfate at a dose of 50 mg/kg has no effect on pain intensity and dose of drug used after Laparoscopic cholecystectomy surgery and also changes systolic and diastolic blood pressure and arterial blood oxygen saturation percentage during and at the end of the operation.

Keywords: Magnesium Sulfate, Pain, Laparoscopic Cholecystectomy

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Introduction

Postoperative pain is a complex physiological response to tissue damage and as one of the most important complications of surgery, can increase morbidity and mortality, incur financial costs and reduce the quality of life of patients by causing clinical and psychological changes in patients [1 , 2]. A postoperative planning that includes all of these factors should be developed to reduce the severity of postoperative pain. Postoperative analgesia with medical and non-medical methods promotes clinical results, prevents complications, saves health services and improves patients' quality of life [3]. Surgery treatment plans recommend the use of regional anesthesia to reduce mortality and reduce cognitive impairment and pain [4]. Proper control of postoperative pain improves postoperative rehabilitation, which can lead to improved short-term and long-term recovery as well as quality of postoperative life [5]. The aim of the present study was the experience of using magnesium sulfate infusion in the operating room to induce analgesia after laparoscopic cholecystectomy.

Material and Methods

This study is a clinical experience in Imam Reza Medical Center of Tabriz [Tabriz University of Medical Sciences in 2018 in 40 candidates for laparoscopic cholecystectomy with ASA class II, I in the age range of 30-60 years and no surgical history Laparoscopic cholecystectomy was performed in the hospital.

Sample size and sampling method

In this study, considering that the number of patients may undergo laparoscopic cholecystectomy during one year, and considering the alpha rate of 0.05 and beta of 80%, the number Forty patients were included in this study who were studied by available sampling method. Patients were divided into two groups based on the use and non-use of magnesium sulfate.

Methods

Magnesium group [M] received 50 mg / kg of IV magnesium sulfate 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 3 /g / kg fentanyl and propofol. 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 / /g / kg were used. 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.

Ethical considerations

This study was conducted after approval by the ethics committee of Tabriz University of Medical Sciences [IR.TBZMED.REC.1398.1163] and in coordination with the director of Imam Reza Hospital [Tabriz Medical Sciences]. The objectives of the study were explained to the patients and after explaining the objectives of the research, informed consent was obtained from all of them.

Statistical analysis

In data analysis, appropriate tests such as T test, Fisher's Exact Test, Kolmogorov-Smirnov, Mann-Whitney U and repeated measures analysis of variance were used. The normality of the data was investigated using a one-sample Klomogorov-Smirnov test. If the data are not normal, Mann-Whitney U test is used. The software used in this research is SPSS 21 and the significance level of the tests is less than 0.05.

Results

The mean of changes in pain at rest was analyzed using analysis of variance with repeated measures, which showed that the age variable had no statistically significant effect on changes in pain at rest [p-value=0.417]. There was 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].

Table 1: The amount of pain changes in different situations based on group and age

Multivariate Tests[a]						
Sig.	Error df	Hypothesis df	F	Value	**Effect**	
0/678	36/000	1/ 000	0/175[b]	0/005	Pillai's Trace	**The rate of change of pain at rest**
0/678	36/000	1/000	0/175[b]	0/995	Wilks' Lambda	
0/678	36/000	1/000	0/175[b]	0/005	Hotelling's Trace	
0/678	36/000	1/000	0/175[b]	0/005	Roy's Largest Root	
0/925	36/000	1/ 000	0/009[b]	0/000	Pillai's Trace	**The rate of change of pain at rest * group**
0/925	36/000	1/000	0/009[b]	1/000	Wilks' Lambda	
0/925	36/000	1/000	0/009[b]	.0/000	Hotelling's Trace	
0/925	36/000	1/000	0/009[b]	0/000	Roy's Largest Root	
0/417	36/000	1/ 000	0/675[b]	0/018	Pillai's Trace	**The rate of change of pain at rest * Age**
0/417	36/000	1/000	0/675[b]	0/982	Wilks' Lambda	
0/417	36/000	1/000	0/675[b]	0/019	Hotelling's Trace	
0/417	36/000	1/000	0/675[b]	0/019	Roy's Largest Root	
0/818	36/000	1/ 000	0/054[b]	0/001	Pillai's Trace	**The rate of change of pain at rest * Group * Age**
0/818	36/000	1/000	0/054[b]	0/999	Wilks' Lambda	
0/818	36/000	1/000	0/054[b]	0/001	Hotelling's Trace	
0/818	36/000	1/000	0/054[b]	0/001	Roy's Largest Root	
a. Design: Intercept + group + age + group * age						
b. Exact statistic						

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 [Table 2].

Table 2: 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	Pillai's Trace	**The rate of change in cough**
0/725	36/000	1/000	0/ 126[a]	0/997	Wilks' Lambda	
0/725	36/000	1/000	0/126[a]	0/004	Hotelling's Trace	
0/725	36/000	1/000	0/126[a]	0/004	Roy's Largest Root	
0/529	36/000	1/ 000	0/404[a]	0/011	Pillai's Trace	**The rate of change in cough * group**
0/529	36/000	1/000	0/404[a]	0/989	Wilks' Lambda	
0/529	36/000	1/000	0/404[a]	0/011	Hotelling's Trace	
0/529	36/000	1/000	0/404[a]	0/011	Roy's Largest Root	
0/925	36/000	1/ 000	0/.009[a]	0/000	Pillai's Trace	**The rate of change in cough * Age**
0/925	36/000	1/000	0/ 009[a]	1/000	Wilks' Lambda	
0/925	36/000	1/000	0/009[a]	0 / 000	Hotelling's Trace	
0/.925	36/000	1/000	0/009[a]	0/000	Roy's Largest Root	
0/519	36/000	1/ 000	0/425[a]	0/012	Pillai's Trace	**The rate of change in cough * Group * Age**
0/519	36/000	1/000	0/425[a]	0/988	Wilks' Lambda	
0/519	36/000	1/000	0/425[a]	0/012	Hotelling's Trace	
0/519	36/000	1/000	0/425[a]	0/012	Roy's Largest Root	
a. Exact statistic						
b. Design: Intercept + group + age + group * age						

The mean rate of changes in systolic blood pressure was assessed using repeated measures analysis of variance, which generally shows significant changes in systolic blood pressure [p-value = 0.003]. Also, there is no statistically significant difference in the rate of changes in systolic blood pressure between the two groups [p-value = 0.208] and it can be said that the two drugs did not have different effects. The mean changes of diastolic blood pressure were analyzed using repeated measures analysis of variance, which generally shows significant changes in diastolic blood pressure [p-value = 0.037]. Also, a statistically significant difference in the rate No changes in diastolic blood pressure were observed between the two groups [p-value = 0.118] and it can be said that the two drugs did not have different effects. The mean rate of change of heart rate was analyzed using analysis of variance with repeated measures, which in general, no significant changes were observed in the rate of change in heart rate per minute [p-value = 0.05]. 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 magnesium sulfate group, the minimum age was 30 years and the maximum age was 60 years. In the normal saline group, the minimum and maximum ages were 30 and 60 years, respectively. In total, the patients were in the age range of 30 to 60 years. There was no significant difference between the two groups in terms of age in the study. 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[6]. In our study, there was no significant difference between the two groups sexually. A similar study examining the effect of magnesium sulfate injection around the operation site for laparoscopic analgesia for cholecystectomy resection in 83 patients found that pain scores in the magnesium sulfate-tramadol group were significantly lower than in the tramadol group [7]. It was at 0, 4 and 12 hours after surgery and this study finally concluded that 50 mg / kg injection of magnesium sulfate during surgery is effective in reducing postoperative pain in laparoscopic cholecystectomy patients [8].

The researchers examined the effect of intra-articular injection of magnesium sulfate for analgesia after knee arthroscopic surgery in 60 patients and concluded that intra-articular injection of magnesium sulfate significantly reduced the pain scores of magnesium sulfate compared to the group. Normal saline results in 1, 2, 6 and 8 hours after the operation [9]. The researchers studied the analgesia caused by bupivacaine alone and bupivacaine with magnesium sulfate intraperitoneally and their effect on pain relief after laparoscopic cholecystectomy in 60 patients and concluded that patients Those who received bupivacaine with magnesium sulfate intraperitoneally at the end of surgery had a greater pain reduction in the first 24 hours after surgery than the bupivacaine group [VAS pain scores in the bupivacaine-magnesium sulfate group were 0-5]. Was compared with the pain scores of the bupivacaine group [7-3]. This study ultimately concluded that the use of a combination of bupivacaine with magnesium sulfate intraperitoneally at the end of laparoscopic cholecystectomy resulted in better pain control than the bupivacaine group [10, 11].

In a study examining the effects of magnesium sulfate on analgesia and reducing the need for narcotic analgesics after cholecystectomy, the researchers found that pain at 6 and 12 hours after surgery was lower in the group receiving magnesium sulfate than in the group. Was a witness [12, 21-23]. [$P < 0.05$] but at 18 and 24 hours after surgery there was no difference between the two groups. The result of this study showed the effect of magnesium sulfate in reducing pain after cholecystectomy [13, 24-26]. 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 magnesium sulfate and normal saline, ie magnesium sulfate had no different effect on reducing pain after Laparoscopic cholecystectomy surgery compared to normal saline. Probably because the above studies confirmed the effect of magnesium sulfate on postoperative analgesia, the study of patients' pain by those studies more often and at times before 6 or 12 hours after anesthesia While in our study, patients' pain was assessed only in two times, ie 6 and 12 hours after the end of anesthesia, and finally it should be said that the reason for the lack of effect of magnesium sulfate on postoperative pain in our study, the need to investigate Has more [14, 27-29].Another study, which aimed to evaluate the analgesic potential around magnesium sulfate infusion in patients undergoing elective cesarean section with spinal anesthesia, concluded that systolic blood pressure was 12 and 4, respectively. Postoperative hours were lower in the normal saline group than in the magnesium sulfate group. Diastolic blood pressure in the magnesium sulfate group at 4, 12 and 24 hours postoperatively was significantly higher than the control group and the heart rate at 4, 8, 12 and 24 hours after surgery in the magnesium sulfate group was significantly higher than the normal group [15, 30-33].

Conclusion

In general, in the present study, by examining 40 Laparoscopic cholecystectomy surgery patients who presented to the hospital with ASA class I and II in the age range of 30-60 years and without a history of Laparoscopic cholecystectomy surgery, we concluded that: administration of magnesium sulfate At a dose of 50 mg/kg has no effect on pain intensity and drug dose after Laparoscopic cholecystectomy surgery and also changes systolic and diastolic blood pressure and arterial blood oxygen saturation during and after surgery compared to the control group. It does not and only causes a significant increase in heart rate compared to the control group at the end of the operation.

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