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ORIGINAL RESEARCH

Comparison Of Magnesium Sulfat Gargle And Ketamine Gargle On The Incidence Of Sore Throat And Cough After Extubation

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ABSTRACT

Background: Postoperative sore throat (POST) or postoperative sore throat is one of the most common complications in patients receiving endotracheal intubation. The incidence of sore throat is reduced by administering mouthwash analgesics. The purpose of this study was to determine the difference in the effectiveness of magnesium sulfate gargle and ketamine gargle on the incidence of sore throat and cough after endotracheal extubation.

Methods: The research was conducted at the Central Surgical Installation of RSUD Dr. Moewardi Surakarta, started in August 2020. This study is an experimental double-blind randomized control trial in patients undergoing general anesthesia after endotracheal extubation. Mann Whitney U test was used to process the data. The research group was divided into two groups, namely magnesium sulfate gargle (M) and ketamine gargle (K).

Results: This study found a significant difference in sore throat when using magnesium sulfat gargle and ketamine gargle on the NRS scale. From the results of the study, there was a significant difference between magnesium sulfate and ketamine gargle at NRS 1 (p = 0.01) and NRS 6 (p = 0.022). In the incidence of cough, there were 7 patients in the magnesium sulfat group who had cough (30.4%) and 7 patients in the ketamine group who had cough (30.4%), the statistical test got p = 1,000 (p> 0.050).

Conclusion: There is a significant difference in the incidence of sore throat which islower in the administration of magnesium sulfate gargle compared to ketamine gargle and there is no significant difference between the administration of magnesium sulfate gargle and ketamine gargle on the incidence of cough after endotracheal extubation.

Keywords: Cough; Endotracheal extubation; Ketamine gargle; Magnesium sulfat gargle; Sore throat

INTRODUCTION

Postoperative sore throat (POST) is one of the most common complications in patients receiving endotracheal intubation. POST can occur between 12-24 hours after surgery and is mild, transient and resolves on its own within a few days[1].

One of the causes of POST is trauma to the pharyngolaryngeal mucosa due tolaryngoscopy and endotracheal tube intubation (ETT).

Magnesium sulfate (MgSO4) is an N-methyl-D-aspartate (NMDA) receptor antagonist that has local analgesic and anti-inflammatory effects and has been reported to reduce the incidence and severity of POST[2,3]. Ketamine is a cyclohexanone derivative that has analgesic and anesthetic effects. Ketamine has been widely used in anesthesia as well as for pain management[4,5].

So far, studies examining the efficacy and effectiveness of prophylactic use of magnesium sulfate mouthwash and comparing it with the use of ketamine gargle on the incidence and level of sore throat and cough after endotracheal extubation are still very limited. A number of studies that previously discussed the high incidence of POST and cough after endotracheal extubation became the author's background to conduct a study that aims to compare the administration of magnesium sulfate mouthwash and ketamine gargle to the incidence of sore throat and cough after endotracheal extubation.

METHODS

This research was conducted at the Operating Teather of Dr. Hospital. Moewardi Surakarta.

The population in this study were all subjects who electively underwent surgery under general anesthesia at the Central Surgical Installation of dr. Moewardi Surakarta. The research sample is the entire population that meets the inclusion criteria and exclusion criteria and is willing to participate in the study.

This study involved 42 patients who underwent surgery using general anesthesia at the Central Surgical Installation of dr. Moewardi Surakarta.

This study was conducted by randomizing and dividing patients who met the inclusion criteria and agreed to participate in this study into two groups, namely 21 patients in the magnesium sulfate group and 21 patients in the

ketamine group. Magnesium Sulfate group is a group of patients who received intervention drugs given through gargling at a dose of 2 mg/kg. The Ketamine group is a group of patients who receive intervention drugs given by gargling with a dose of 0.5 mg/kg.

The data obtained were then analyzed using the Mann-Whitney test to determine the incidence of sore throat between the 2 groups.

RESULT

Characteristics of Research Subjects

The characteristics of the subjects of this study included gender, age, BMI and duration of surgery. Categorical data (gender and BMI) are presented with the value of frequency distribution and percentage followed by Chi Square/Fisher Exact Test, then numerical data (age and duration of operation) are presented in the mean value + standard deviation and followed by the Independent T test if the data normally distributed, and Mann Whitney test if the data is not normally distributed. Normality test using Shapiro Wilk test. The results of the analysis of these characteristics can be seen in table 1 as follows:

Table 1. Characteristics of Research Subjects

Characteristic	Agent		p-value
	MgSO4 (n=23)	Ketamin (n=23)	
Gender			0,768
Male	11 (47,8%)	12 (52,2%)	
Female	12 (52,2%)	11 (47,8%)	
Age	39,91±13,95	37,74±11,38	0,566
BMI[a]			0,243
Normal	21 (91,3%)	17 (73,9%)	
Overweight	2 (8,7%)	6 (26,1%)	
Operation Time	72,61±23,64	81,30±20,07	0,059

Based on the description above, the results showed that the characteristics of the research subjects which included gender, BMI age and duration of surgery did not indicate a significant difference between the MgSO4 group and the ketamine group, there could be said to be homogeneous.

Comparison Between Giving MgSO4 Gargle With Ketamine Gargle Against The Incidence Of Sore Throat

Before testing the difference in the incidence of sore throat between MgSO4 and ketamine gargle on the incidence of sore throat, a test was conducted using the Mann-Whitney test. the data is said to have a significant difference if the p value <0.05.

Table 2. Comparison between MgSO4 mouthwash and ketamine gargle on the incidence of sore throat

Variable	Agent		p-value
	MgSO4 (n=23) F (%)	Ketamin (n=23) F (%)	
Incidence of Cough			1,000
Not Cough	16 (69,6%)	16 (69,6%)	
Cough	7 (30,4%)	7 (30,4%)	

Based on table 2, it is known that there are significant differences between magnesium sulfate and ketamine gargle at NRS 1 (p = 0.01) and NRS 6 (p = 0.022).

Based on the description above, it is known that there is a decrease in NRS scores in both the MgSO4 group and also the ketamine group, where the NRS score in the MgSO4 group is lower than the ketamine group, and indicates a significant difference at 1 hour and 6 hours after extubation. Based on these results, it can be seen thatMgSO4 showed better effectiveness in reducing throat pain scores at 1 hour and 6 hours after extubation compared to ketamine, while at 12 hours and 24 hours after extubation there was no significant difference.

Comparison Between Giving MgSO4 Mouthwash With Ketamine Gargle Against Cough Incidence

Comparison between the administration of MgSO4 gargle and ketamine gargle on the incidence of cough was tested using the Chi Square test because the data were nominally categorical. Results Comparison between MgSO4 mouthwash and ketamine gargle on the incidence of cough can be seen in table 3.

Table 3. Comparison between MgSO4 mouthwash and ketamine gargle on the incidence of cough.

Sore Throat	Agent		p-value
	MgSO4 (n=23) *Mean ±SD*	Ketamin (n=23) *Mean ±SD*	
NRS 1	1,91±0,90	2,83±1,27	0,012*
NRS 6	1,65±0,65	2,09±0,60	0,022*
NRS 12	1,26±0,62	1,35±0,57	0,652
NRS 24	0,35±0,49	0,57±0,51	0,143

Based on table 3. it is known that there are 7 patients in the MgSO4 group who have cough (30.4%), and there are 7 patients in the ketamine group who have cough (30.4%), statistical tests get a p value=1,000 (p>0.050 which means that there is no significant difference in the incidence of cough between the MgSO4 group and the ketamine group).

DISCUSSION

From the data on sex, age, BMI and duration of surgery between groups, there were no significant differences between groups. Theoretically, the risk of postoperative sore throat is greater in young age, female sex, difficult

intubation, and patients with chronic disease. Younger patients have smaller laryngeal and tracheal sizes, making them more prone to mucosal edema. Sore throat is more common in women because the mucosa is thinner so it is easy for edema to occur. However, the results showed that there were no significant differences in the characteristics of the study subjects including gender, age, BMI and duration of surgery between the MgSO4 group and the ketamine group on the incidence of POST throat pain. This study is in accordance with the research conducted by Lalwani et al. (2017), where the characteristics of the research subjects in the form of age, height, weight, duration of surgery and intubation were similar between the 2 groups[6].

Based on table 2, it was found that MgSO4 showed better effectiveness in reducing throat pain scores at 1 hour and 6 hours after extubation compared to ketamine, while at 12 hours and 24 hours after extubation there was no significant difference.

These results are in accordance with the statement of Jain et al. (2017) who explained that both ketamine and MgSO4 both have indirect analgesic effects and have the same mechanism of action, namely they can block the N-methyl-D-aspartic acid (NMDA) receptor, a receptor found in the pharyngeal mucosa and as a calcium channel. blockade may provide local analgesic effects including analgesia for POST sore throat, however magnesium (MgSO4) may block calcium channels to the tracheal muscle in a more effective manner than ketamine[7].

Based on Table 3, it is known that there were 7 patients in the MgSO4 group who had cough (30.4%), and there were 7 patients in the ketamine group who had cough (30.4%), statistical tests found that there was no significant difference in the incidence of cough between the MgSO4 group with the ketamine group.

Clinical trial by Lalwani et al. (2017) suggested that preoperative gargling with ketamine was effective in reducing the incidence and severity of postoperative sore throat, hoarseness and coughing compared to normal saline, up to 24 hours post-extubation. Ketamine gargle is the best simple and effective way to control postoperative sore throat, hoarseness and cough in patients undergoing general anesthesia with

endotracheal intubation[6]. Ketamine plays a protective role against lung injury, due to its anti-inflammatory properties. Ketamine acts by reducing TNF kappa B activity, reducing TNF-alpha production and reducing nitric oxide synthesis. Administration of ketamine reduces several central components and the inflammatory and protective effects of ketamine in allergen-induced airway inflammation trauma and high airway reactivity in asthma[8].

Magnesium is an effective bronchodilator but does not affect respiratory drive. There are 2 mechanisms that explain the inhibitory effect of MgSO4 on coughing. The first results from the bronchodilating effect of MgSO4 mediated by neuromuscular cholinergic inhibition, transmission and attenuation of calcium-induced muscle contraction, blockade of N-methyl-D-aspartate (NMDA) receptors in the larynx, lungs, and airways[9]. In addition, MgSO4 acts as a calcium channel blocker at presynaptic nerve endings and reduces the release of acetylcholine at the motor endplate, thereby reducing the excitability of muscle fibers and reducing the amplitude of the endplate action potential. Therefore, sudden adduction of the vocal cords or supraglottic obstruction and stiffness of both due to coughing can be suppressed[10].

CONCLUSION

Based on the results of the study, there was a significant difference between giving MgSO4 gargle and ketamine gargle on the incidence of sore throat where the incidence of post-extubation sore throat was lower in the group given MgSO4 gargle and nosignificant difference between the administration of MgSO4 gargle with ketamine gargle on the incidence of cough after endotracheal extubatuin

CONFLICT OF INTEREST

There is no conflict interest in this research.

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