Original Research

Comparison Of The Use Of Two Methods Of Lidocaine And Lubricant Gel On Reactions Coming Out Of Anesthesia With Two Methods Of Using Laryngeal Mask And Endotracheal Tube In Patients Undergoing Cataract Surgery: A Randomized Double-Blind Clinical Trial Study

Mohammad Rahmanian[1], Navid Kalani[1], Seyed Ahmad Razavizadegan[2], Shima Mohammad Jafari[3], Reza Sahraei[1*]

1. Anesthesiology, Critical care and pain management research center, Jahrom University of Medical Sciences, Jahrom, Iran.
2. Department of Ophthalmology, Jahrom University of Medical Sciences, Jahrom, Iran. Orcid.org/0000-0001-7939-1961
3. Student Research Committee, Jahrom University of Medical Sciences, Jahrom, Iran. 0000-0003-1900-4215

***Corresponding Author: Reza Sahraei**, Associated professor of anesthesiology, Jahrom University of Medical Sciences, Jahrom, Iran. Email: sahraeir1354@gmail.com. Orcid: 0000-0002-3544-9153

Abstract:

Background:

Cataract surgery should have the least stimulation reactions after anesthesia due to high sensitivity. The results of studies on the severity and duration of hemodynamic changes caused by endotracheal intubation and laryngeal mask have not yet reached definitive results, so the study aims to compare LMA and ETT using two methods of lidocaine and lubricant gel on the reactions Exit from anesthesia was performed in patients undergoing cataract surgery.

Methods:

This randomized clinical trial study was conducted on 90 patients undergoing cataract surgery. Patients were randomly divided in two groups and three subgroups receiving lidocaine gel, lubricant gel or normal saline. Episodes of cough, sore throat, and nausea and vomiting were recorded in the ophthalmology department during recovery 1, 6, 12, and 24 hours after surgery.

Results: The findings of the present study show that the groups have no significant differences in terms of demographic characteristics. In the lubricant, lidocaine and normal saline groups, there was no significant difference between the LMA and ETT groups in terms of complications after leaving anesthesia.

Conclusion:

In the lubricant, lidocaine and normal saline groups, there was no significant difference between the LMA and ETT groups in terms of complications after coming out of anesthesia. It is suggested to investigate this issue in different surgeries with more patients in future studies.

Keywords: Lubricant Gel, Lidocaine Gel, Cataract, Laryngeal Mask Airway, Endotracheal Tube

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Introduction

Cataract is one of the most common eye diseases in old age, which usually results in blurred vision followed by low vision (1). It is estimated that around 30 million people worldwide suffer from low vision every year, and half of them are due to cataracts (2). In any surgery, airway control is one of the most important skills among anesthesiologists. Problems in airway control are one of the most important causes of mortality and morbidity related to anesthesia (3). Some tools provide adequate oxygenation and ventilation to the patient during surgery by creating a safe airway in patients under anesthesia. One of these tools is endotracheal tube. Although ETT is the most reliable way to provide airway in many ways and is absolutely required in cases such as fullness of the patient's stomach in general anesthesia, but it can cause tachycardia, increased blood pressure, heart rate irregularity, increased intracerebral pressure and myocardial ischemia in patient become susceptible (4). Therefore, in this field, various methods have been used to reduce hemodynamic responses, including narcotic drugs, beta receptor blockers, arterial dilators, and local anesthetics (5). In addition, physiological responses are common when leaving anesthesia and during the removal of the patient's ETT, which can lead to complications such as cough, laryngospasm, bronchospasm, tachycardia, and hypertension (6). Other important complications caused by coughing during tracheal tube removal are increased intracerebral and eye pressure, bleeding from the surgical site, and myocardial ischemia (7). Another tool for creating a safe airway in patients under anesthesia is the Laryngeal Mask Airway, which has become popular among anesthesiologists during the last decade. Laryngeal mask is commonly used to create a safe airway and maintain spontaneous ventilation in short outpatient surgeries in patients under general anesthesia (8-10). This airway method is often indicated for patients who have problems with conventional intubation or for whom intubation was impossible (11). In practice, it has also been seen that patients experience thermodynamic changes in systolic and diastolic blood pressure and heart rate during surgery after inflating the cuff of the LMA tube, or that after anesthesia they experience withdrawal reactions such as coughing, sore throat, nausea and vomiting. They become (12). Although the use of LMA instead of ETT reduces the complications of surgeries in the adjacent areas of the airways, but sore throat in the absence of endotracheal intubation and using LMA has also been reported (13). The prevalence of this complication after intubation has been reported as 14.4 to 50% and after LMA insertion as 5.8 to 34% (14). Different ways are used for a smooth exit from anesthesia, which include: intravenous administration of narcotics, lidocaine, dexmedetomidine, beta-adrenergic drugs and calcium channel blockers (15-17). All these methods are associated with side effects and their results are not very satisfactory. Although lubricants containing local anesthetics reduce the reaction to LMA during recovery from anesthesia and significantly reduce nausea and vomiting upon awakening from anesthesia (18-19), some studies exist. They reject the above benefits and some have shown that lidocaine spray or gel causes a significant increase in the prevalence of cough, sore throat and the risk of aspiration after surgery (20-21). Considering the contradictory findings and the existence of controversy regarding LMA and ETT and the effectiveness of topical lubricants and lidocaine in reducing the reactions of patients coming out of anesthesia, this study aims to compare LMA and ETT using two methods of lidocaine gel and lubricant gel. Hemodynamic symptoms were investigated in patients undergoing cataract surgery referred to Jahrom Motahari Hospital.

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Method

In this double-blind randomized clinical trial study, the researcher referred to Motahari Hospital in Jahrom city after the approval of the Ethics Committee of the Research Vice-Chancellor of Jahrom University of Medical Sciences (IR.JUMS.REC.1399.147). The inclusion criteria for the study include: patients who are candidates for cataract surgery under general anesthesia using the phacoemulsification method, physical status 1 according to the American Society of Anesthesiologists (ASA), mallampati class 1, age between 35 and 75 years, no history (allergic to drugs Anesthesia, cardiorespiratory arrest, congestive heart failure, head trauma, glaucoma, hypotension, evidence of increased intracerebral pressure, psychosis, schizophrenia, active infection of the upper respiratory tract), not taking drugs that interfere with heart rate and blood pressure. Exclusion criteria also include: difficult intubation and risk of aspiration, occurrence of any complications that lead to termination of the operation. At first, the researcher took a history from the patients and the researcher-made checklist containing the demographic information of the patients (including: age, sex, weight, height, body mass index, BMI) was completed for them. Then, it was explained to all the patients about the study that their airway device during anesthesia is one of the two devices, endotracheal tube or laryngeal mask airway, and the safety of both mentioned methods was pointed out to them, and they were reminded to retain the information. Confidentiality was emphasized. The samples also completed a written informed consent form. Then the patients in both groups were divided into three subgroups receiving lidocaine gel, lubricant gel or normal saline. Patients were divided into one of the two methods of laryngeal mask and endotracheal tube according to the entry and exit criteria and were subjected to the same anesthesia. Under the same anesthesia, it means that the anesthetic drugs were the same for all patients. Both types of laryngeal mask and tracheal tube procedures were performed using all three types of lubricant gel, lidocaine gel, and normal saline. The amount of epigastric pain, the amount of sedation and agitation in recovery, cough, sore throat, nausea and vomiting and shivering of the patient immediately after transfer to recovery, 1, 6, 12 and 24 hours after surgery in the ophthalmology department by the researcher in Czech The list was registered. SPSS version 21 software was used to check the data. Descriptive statistics indicators such as mean, standard deviation and percentage were used to describe the data, Mann-Whitney or Wilcoxon tests were used to compare the averages in two groups, and Chi-square test was used to check the relationship between variables with qualitative scale. $P<0.05$ was considered statistically significant.

Result

90 patients aged 44 to 75 years were evaluated with two types of laryngeal mask and tracheal tube methods using all three types of lubricant gel (30 patient), lidocaine gel (30 patient) and normal saline (30 patient). The average age of the patients in the study groups was over 60 years, and the body mass index was within the normal range in the majority of patients. The results showed that the study groups are similar in terms of age and body mass index and duration of surgery ($p < 0.05$).

In the lubricant group, there was no significant difference between the two LMA and ETT groups in terms of the level of agitation when leaving anesthesia ($P<0.05$). The level of agitation when coming out of anesthesia in the majority of patients in the ETT group and the LMA group was calm and quiet.

In the lidocaine gel groups, there was no significant difference between the LMA and ETT groups in terms of the level of agitation when leaving anesthesia ($P<0.05$). The level of

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agitation when coming out of anesthesia in the majority of patients in the ETT group and the LMA group was calm and quiet. Mild but palliable agitation in the LMA group (53.3%) was more than the ETT group (26.7%). In the normal saline group, there was a significant difference between the LMA and ETT groups in terms of the level of agitation when coming out of anesthesia. It did not exist (P>0.05). The level of agitation when coming out of anesthesia in the majority of patients in the ETT group and the LMA group was calm and quiet. Mild but palliable agitation in LMA group patients (40%) was more than ETT group (20%) (Table 1).

In the lubricant group, there was no significant difference between the LMA and ETT groups in terms of Ramsey sedation rate (P<0.05). The rate of Ramsey sedation in the majority of patients in the ETT group was confused but responding to verbal commands (60%) and drowsy in the LMA group (40%). In the lidocaine group, there was no significant difference between the LMA and ETT groups in terms of Ramsey sedation rate (P<0.05). The rate of Ramsey sedation in the majority of patients in the ETT group was confused but responding to verbal commands (66.7%) and in the LMA group it was confused but responding to verbal commands (46.7%). In the normal saline group, there was no significant difference between the LMA and ETT groups in terms of Ramsey sedation rate (P<0.05). The rate of Ramsey sedation in the majority of patients in the ETT group was confused but responding to verbal commands (46.7%) and drowsy (53.3%) in the LMA group (Table 2).

In the lubricant group, there was no significant difference between the LMA and ETT groups in terms of complications after leaving anesthesia (P<0.05). The highest frequency of complications after coming out of anesthesia in ETT group patients was in the form of sore throat and hypertension and in the LMA group in the form of sore throat, cough and hypertension. In the lidocaine group, there was no significant difference between the LMA and ETT groups in terms of complications after leaving anesthesia (P<0.05). The highest frequency of complications after coming out of anesthesia in ETT group patients was in the form of cough and hypertension and in the LMA group in the form of sore throat, cough and hypertension. In the normal saline group, there was no significant difference between the LMA and ETT groups in terms of complications after leaving anesthesia (P<0.05). The highest frequency of complications after coming out of anesthesia in ETT group patients was in the form of sore throat, cough and hypertension and in the LMA group in the form of sore throat, cough and hypertension (Table 3).

Discussion

The results of the demographic data analysis showed that the studied groups are similar in terms of age and body mass index and duration of surgery. In a study by Keller et al., lidocaine gel was compared with saline and it was shown that lidocaine reduces complications after leaving anesthesia by 2% (22). The patient's ventilation pattern and induction drugs play a role in the occurrence of sore throat, it is also reported that muscle relaxants have no effect on the occurrence and severity of throat problems (23). Sore throat is one of the most common postoperative complaints following tracheal intubation, laryngeal mask use, oral airway placement, and even mask ventilation. The incidence of LMA-induced sore throat has been reported to be related to insertion methods and techniques, user experience, LMA airway size, and cuff pressure. The results of the present study showed that in the lubricant, lidocaine and normal saline groups, there was no significant difference between the LMA and ETT groups in terms of complications after leaving anesthesia. In the lubricant group, the highest frequency of complications after

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exiting from anesthesia in ETT group patients was in the form of sore throat and hypertension, and in the LMA group, it was in the form of sore throat, cough and hypertension. In the lidocaine group, the highest frequency of complications after coming out of anesthesia in ETT group patients was in the form of cough and hypertension and in the LMA group in the form of sore throat, cough and hypertension. In the normal saline group, the highest frequency of complications after coming out of anesthesia in ETT group patients was in the form of sore throat, cough, and hypertension, and in the LMA group, it was in the form of sore throat, cough, and hypertension. Consistent with the results of the present study, Keller et al.'s study (22) and Park et al.'s study found that there is no significant relationship between facilitators such as lidocaine gel and normal saline used for LMA placement and postoperative sore throat. In line with the results of the present study, in the study of Damshenas et al., who examined the effect of lubricant gel and normal saline on hemodynamic symptoms during the placement of a laryngeal airway mask, the results showed that sore throat and cough after surgery to lubricant gel and normal saline, which are used for It is not related to smearing the airway larynx mask and facilitating its installation (24). In Gilani et al.'s study, with the aim of investigating the reduction of sore throat after placing a laryngeal mask airway; A comparison of lidocaine gel, normal saline and mouthwash was made and it was found that there is no significant difference between the three groups in terms of the amount of sore throat after the operation, which is consistent with the results of the present study (20). Also, from other studies in line with the present study, it was shown in Hazrati et al.'s study that applying LMA with lidocaine gel instead of lubricant gel causes a significant reduction in the severity of sore throat and cough (25). In contrast to these results, Singh et al. reported in their research that the use of normal saline and lidocaine in the group of ETT patients reduces complications after coming out of anesthesia, including sore throat (26). In this regard, Wetzel and colleagues also used 4% lidocaine for injections after coming out of anesthesia with the ETT method (27). Also, in the study of Fagan et al., the results showed that lidocaine reduces cough after coming out of anesthesia with the ETT method (28). Meanwhile, Groeben and Peters believe that lidocaine gel causes irritation or damage compared to lubricant gel and not only does not reduce the incidence of sore throat, but also increases the frequency of voice violence, paresthesia of the tongue, nausea and vomiting (29). It has been shown in many studies that the use of LMA causes hoarseness and hoarseness due to the trauma it inflicts on the throat. Probable factors involved in the occurrence of sore throat following LMA insertion include the amount of air in the cuff at the time of insertion, the size of the mask, the number of attempts for correct insertion, the way the patient is ventilated during anesthesia, and the amount of trauma during insertion (30). Some studies have attributed the cause of sore throat to trauma to the throat and larynx, while even with a face mask, which does not cause trauma to these areas, 8% of patients experience sore throat (31). Studies on the effectiveness of lidocaine on reducing sore throat have been done on patients who underwent intubation with ETT. The etiology of sore throat in intubated patients includes scratching caused by the cuff of the tube, trauma caused by pushing and coughing on the tube, friction between the mucosa of the tube and the tube during anesthesia and dehydration. Although the mechanism by which lidocaine suppresses respiratory and pharyngeal reflex responses following ETT intubation is unclear, the possible effects include general anesthesia, direct block of painful stimuli, and weakening of motor function. Also, lidocaine can inhibit the stimulation of sensory c fibers and reduce the

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secretion of sensory neuropeptides such as tachykinins, which cause bronchial contraction. The reason for this can be due to the different type of device used. Lubrication with water-soluble gel seems to soften the cuff of the tracheal tube and reduce the effect of the cuff rubbing with the tracheal mucosa during force or the patient's neck movements during surgery. It is not yet clear why the prevalence of postoperative sore throat is so widely reported. The reason for this can be due to various factors such as insertion technique, pressure on the laryngeal membrane, length of surgery and the type of lubricant used (32).

Conclusion

In the lubricant, lidocaine and normal saline groups, there was no significant difference between the LMA and ETT groups in terms of complications after leaving anesthesia. It is suggested to investigate this issue in different surgeries with more patients in future studies.

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Tables

Table 1: Comparison of agitation when coming out of anesthesia in three types of lubricant gel, lidocaine gel and normal saline

Group	**Agitation when coming out of anesthesia**	**LMA**		**ETT**		**P-value**
		n	%	n	%	
Lubricant	quiet person	9	60	12	80	0.37
	Mild but soothing agitation	6	40	3	20	
	Moderate agitation, aimless movements and insatiable	0	0	0	0	
	severe agitation	0	0	0	0	
Lidocaine	quiet person	7	46.7	11	73.3	0.22
	Mild but soothing agitation	8	53.3	4	26.7	
	Moderate agitation, aimless movements and insatiable	0	0	0	0	
	severe agitation	0	0	0	0	
Normal saline	quiet person	9	60	12	80	0.37
	Mild but soothing agitation	6	40	3	20	
	Moderate agitation, aimless movements and insatiable	0	0	0	0	
	severe agitation	0	0	0	0	

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Table2: Comparison of Ramsay Sedation in three types of lubricant gel, lidocaine gel and normal saline

Group	Ramsay Sedation	LMA		ETT		P-value
		n	%	n	%	
Lubricant	Restless	0	0	0	0	0.174
	calm and alert	0	0	1	6.7	
	Sleepy	6	40	9	60	
	Confused but responding to verbal commands	9	60	5	33.3	
	No response to verbal commands	0	0	0	0	
	No response to painful stimuli	0	0	0	0	
Lidocaine	Restless	0	0	0	0	0.653
	calm and alert	1	6.7	2	13.3	
	Sleepy	4	26.7	5	33.3	
	Confused but responding to verbal commands	10	66.7	7	46.7	
	No response to verbal commands	0	0	1	6.7	
	No response to painful stimuli	0	0	0	0	
Normal saline	Restless	0	0	0	0	0.99
	calm and alert	0	0	0	0	
	Sleepy	8	53.3	8	53.3	
	Confused but responding to verbal commands	7	46.7	7	46.7	
	No response to verbal commands	0	0	0	0	
	No response to painful stimuli	0	0	0	0	

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Table 3: Comparison of Side effects after anesthesia reactions in three types of lubricant gel, lidocaine gel and normal saline

Group	Side effects after anesthesia reactions	LMA		ETT		P-value
		n	%	n	%	
Lubricant	Cough	5	33.3	2	13.3	0.39
	Sore throat	6	40	4	26.7	0.7
	Epigastric pain	0	0	1	6.7	0.99
	Delay in the disease	4	26.7	0	0	0.99
	Bradycardia	0	0	1	6.7	0.99
	tachycardia	2	13.3	1	6.7	0.99
	Hypotension	0	0	0	0	-
	Hypertension	15	100	13	86.7	0.48
	Tachypnea	2	13.3	3	20	0.99
	Bradypnea	1	6.7	0	0	0.99
Lidocaine	Cough	11	73.3	8	53.3	0.49
	Sore throat	4	26.7	7	46.7	0.45
	Epigastric pain	0	0	0	0	-
	Delay in the disease	6	40	1	6.7	0.08
	Bradycardia	0	0	1	6.7	0.99
	tachycardia	2	13.3	2	13.3	0.99
	Hypotension	0	0	0	0	-
	Hypertension	10	66.7	9	60	0.99
	Tachypnea	5	33.3	4	26.7	0.99
	Bradypnea	0	0	0	0	-
Normal saline	Cough	8	53.3	6	40	0.71
	Sore throat	8	53.3	6	40	0.72
	Epigastric pain	0	0	0	0	-
	Delay in the disease	0	0	0	0	-
	Bradycardia	1	6.7	0	0	0.99
	tachycardia	0	0	1	6.7	0.99
	Hypotension	0	0	0	0	-
	Hypertension	14	93.3	11	73.3	0.33
	Tachypnea	3	20	3	20	0.99
	Bradypnea	0	0	0	0	-

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