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## The Effect of 2% lidocaine Injection into Endotracheal Tube on the Incidence of Cough and Laryngospasm after Tracheal Extubation during General Anesthesia in Patients Undergoing Eye Surgery

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### ABSTRACT

Oral endotracheal intubation is a common method for airway maintenance and management in critical situations and is used for a variety of surgical procedures in operating rooms for airway management. This study aimed to investigate the effect of 2% lidocaine injection into endotracheal tube on the incidence of cough and laryngospasm after tracheal extubation during general anesthesia in patients undergoing eye surgery at Valiasr Hospital. This clinical trial was conducted on 96 patients older than 20 years of age undergoing eye surgery. After anesthesia with midazolam, thiopental, and atracurium, intubation was performed by a skilled person in both groups. The experimental group received 100 mg (5 CC) 2% lidocaine, kept at operation room temperature, instilled by a sterile syringe into the endotracheal tube a minute before reverse intubation to the patient, but the control group received no intervention. Five to ten minutes before the end of surgery, anesthetics were discontinued and after surgery, the endotracheal tube was removed. Then, the heart rate, the mean arterial pressure, the number of patient's cough in three states and laryngospasm in five states were recorded. The findings showed that there was a significant difference in the frequency of cough on arrival to the recovery room between patients in the control and case groups ( $p=0.03$ ), but no significant difference was observed between the frequency of coughing during extubation and leaving the recovery room. A significant difference was observed between the two groups ( $p<0.05$ ) in terms of the heart rate on arrival to the recovery room and leaving the recovery room, and also in terms of the incidence of cough on arrival to the recovery room.

**Keywords:** Lidocaine, Laryngospasm, Endotracheal Tube, Eye Surgery

### INTRODUCTION

Oral endotracheal intubation is a common method for airway maintenance in surgical procedures in operation rooms for airway management.[1]

In spite of the developments in anesthesia, endotracheal intubation can cause unwelcome complications such as trauma to the laryngeal nerve and hoarse voice, dysphagia and sore throat after the surgery [2] sputum and laryngospasm.[3-5]

Edomwonyi and colleagues reported 63% of surgical population had throat complications after surgery and Kolawole and Shaq also reported 72.5% of postoperative airway complications was among obstetric and gynecological population.[3-5]

Increased 10-30% blood pressure and heart rate that last 5-15 minutes, dangerous arrhythmias, myocardial ischemia, acute cardiac failure, pulmonary edema or cerebrovascular haemorrhage are tragedy in some situations such as ocular surgeries, cardiac disease, intracranial surgeries or aneurysm surgeries. These complication are common after tracheal intubation and estuation.[6, 7]

Doses of Verapamil] In addition to say above, 30-45 degrees flecion of head and neck in ophthalmic operations causes replacement of endotracheal tube, mucus release and stimulation cough. All of these increase the intraocular pressure[IOP].[8] Furthermore one response to intubation and Inflation of the endotracheal cuff is a rise in intraocular pressure [IOP].[1, 5, 9]

Another serious complication Occur during tracheal intubation and estuation is laryngospasm. It causes decrease in o<sub>2</sub>saturation, negative pressure pulmonary and edema and death. The frequency of laryngospasm is 1.7-25% in children. Studies show lidocaine [Intravenous or local] is a preventive method.[10]

use of laryngeal mask airway instead of endotracheal intubation and lidocaine intra-cuff or intravenouslidocaine are some solutions.[6]

According as D' Aragon, Takeaway, tavakoli showed in their studies.[2, 4, 11]

Therefore, the purpose of this study was to inject 2% lidocaine into endotracheal tube to decrease cough and laryngospasm in patients undergoing eye surgery at the time of estuation.

#### **MATERIALS AND METHODS**

In this study, 96 patients, in physical status class I and II (according to American Society of Anesthesiology classification), older than 20 years undergoing eye surgery were selected.

After explaining the study's objectives and obtaining informed consent, participants were randomly assigned to two groups.

After anesthesia with midazolam (0.05 mg/kg body weight), thiopental (5 mg/kg body weight), and atracurium (0.5 mg/kg body weight), both groups were intubated by a skilled person. Then the patients were connected to the ventilator and anesthesia maintained with halothane 0.8 MAC (Minimal Alveolar Concentration), oxygen and nitrous oxide four liters per minute.

The experimental group received 100 mg (5 CC) 2% lidocaine, kept at operation room temperature, instilled by sterile syringe into the endotracheal tube minute before reverse infusion to the patient, but the control group received no intervention. Five to ten minutes before the end of surgery, anesthetics were discontinued and after surgery, the endotracheal tube was removed. Then, the heart rate, the mean arterial pressure, the number of patient's cough in three states (no cough, moderate cough, including 1 to 5 coughs, and severe cough, including more than 5 coughs) and laryngospasm in five states: no laryngospasm, low laryngospasm(treatment with maneuver), moderate (treatment with maneuver and oxygen with positive pressure),moderately severe (treatment with increasing depth of anesthesia) and severe (re-treatment with succinylcholine chloride or intubation)were recorded by another person who was blinded to the intervention method and control and experimental groups. The heart rate and the mean arterial pressure were measured four times (before surgery, after estuation in the operating room, on arrival to the recovery room and when leaving the recovery room) and also the number of patient's cough and laryngospasm were measured three times (immediately after estuation in the operating room, on arrival to the recovery room and when leaving the recovery room).

To collect data, checklist prepared by the researcher was used including the heart rate, mean arterial pressure, the number of coughs and laryngospasm in the patient, and its validity was confirmed by six faculty members.

**Statistical analysis:** Statistical analyses were performed using SPSS version 16.0 (SPSS Inc., Chicago, IL). The normally distributed data were reported as means ± SD. Logarithmic conversion was performed on skewed variables. For comparing dictomatus variables, Chi-square test and independent T test was used. A P-value< 0.05 was considered statistically significant.

**RESULTS**

The results showed that 37 patients (38.5%) were men and 59 patients (61.5%) were women, 47% of control patients and 34% of case patients were aged over 60 years and the distribution of age groups 20-40 and 40-60 years was similar in both groups, 45.7% of control patients and 52% of case patients were illiterate. Other demographic data are given in Table 1.

No significant difference was observed between the mean heart rate before surgery and after tracheal estuation in both groups (p>0.05), but the mean heart rate on arrival to the recovery room and leaving the recovery room was significantly higher in the case group than in the control group(p=0.003). The results are shown in Table 2.

Moderate cough was observed in 19.6% of the control and 6% of the case group on arrival to the recovery room and 4.3% of the control had severe cough and this difference was statistically significant (p=0.03). The results are shown in Table 3.

**Table 1**Patients’characteristics according to ASA class and Mallampati class and addiction history

addiction history	Has		Has not		Total	
	Number	Percent	Number	Percent	Number	Percent
Control	42	91.3	4	8.7	46	100
Case	46	92	4	8	50	100
<b>Total</b>	<b>88</b>	<b>91.7</b>	<b>8</b>	<b>8.3</b>	<b>96</b>	<b>100</b>

  

ASA	1		2		Total	
	Number	Percent	Number	Percent	Number	Percent
Control	24	52.2	22	47.8	46	100
Case	29	58	21	42	50	100
<b>Total</b>	<b>53</b>	<b>55.2</b>	<b>43</b>	<b>44.8</b>	<b>96</b>	<b>100</b>

  

Mallampati	1		2		Total	
	Number	Percent	Number	Percent	Number	Percent
Control	27	58.7	19	41.3	46	100
Case	31	62	19	38	50	100
<b>Total</b>	<b>58</b>	<b>60.4</b>	<b>38</b>	<b>39.6</b>	<b>96</b>	<b>100</b>

**Table 2** Comparison of the mean number of heart rate in patients in case and control groups at various stages of operation

Conditions	Group	Mean ± standard deviation	t	df	p
Before surgery	Control	82±12	1.30	90	0.20
	Case	86±17			
Endotracheal tube extubation	Control	88±16	0.96	90	0.34
	Case	91±14			
The time of arrival to the recovery room	Control	78±11	3.05	90	0.003
	Case	85±11			
The time of leaving the recovery room	Control	75±10	3.04	90	0.003
	Case	82±12			

**Table 3** Comparison of frequency distribution of coughon arrival to the recovery room in patients in case and control groups

Cough Group	No cough		Moderate cough		Severe cough		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
Control	35	76.1	9	19.6	2	4.3	46	100
Case	47	94	3	6	0	0	50	100
<b>Total</b>	<b>82</b>	<b>85.4</b>	<b>12</b>	<b>12.5</b>	<b>2</b>	<b>2.1</b>	<b>96</b>	<b>100</b>

Fisher Exact test=6.12 p=0.03

There was no significant difference between the patients of the two groups in terms of coughing during estuation, ability to keep the head up, coughing when leaving the recovery room, the incidence of laryngospasm during estuation, incidence of laryngospasm when entering the recovery, and the mean MAP.

According to above table, 19.6% of control patients and 6% of case patients had moderate cough on arrival to the recovery room and 4.3% of control patients had severe cough, and the difference was statistically significant ( $p=0.03$ ).

### DISCUSSION

Our findings showed a significant difference between the two groups in terms of the heart rate on arrival to the recovery room and leaving the recovery room and also the cough rate on arrival to the recovery room. Due to the reduced incidence of cough in patients who received 2% lidocaine in the endotracheal tube, hemodynamic changes were expected to be lower in this group. So, the increase in heart rate on arrival to the recovery room and leaving the recovery room may be due to inaccuracies of pulseoximetry in measuring heart rate, therefore, it's recommended that in future studies digital and more accurate devices be used to investigate hemodynamic changes. In the study of Dr.Guler was found the incidence of cough in comparison with placebo group reduced in patients who received 2% lidocaine.(7)

Mihara *et al* in a systematic review at 2014 showed that lidocaine is effective in preventing laryngospasm in children during general anesthesia.(10)

D'Aragon showed that Sprayed lidocaine lower the incidence of cough at tracheal intubation. The use of lidocaine into endotracheal cuffs had no impact on decreasing the incidence of cough or pain.(11)

As well as Gecaj-Gashi *et al.* demonstrated in their study in 2013 that IV lidocaine can decrease fentanyl-induced cough in children.(12)Also takeaway *et al.* reported to make use of lidocaine modify occurring cough and sore throat after operation.(4)

According studies, controlling cough is valuable at different levels. Given the safety in eye surgery, coughing will increase IOP and eye damage. In the wake of an eye injury, the surgery and anesthesia teams, operating room personnel, and all people involved have to spend time on resolving the problem and this also incurs heavy costs to patient and hospital; so hospitals need more people. Controlling cough, we could increase surgical safety factor and decrease eye damage. In this project, hospital costs were saved; patients enjoyed a better health condition and spent less money and less time in the hospital.

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