Original Research

Comparison Of The Effects Of Two Methods Of Using Lidocaine Gel And Lubricant Gel During Placement Of A Laryngeal Airway Mask On Hemodynamic Symptoms During Orthopedic Surgery

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Abstract:

Background: Complications of intubation are almost common and include up to 4% of all patients, LMA is used to maintain the airway and spontaneous breathing or control during short-term surgeries. During surgery, patients experience hemodynamic changes in systolic and diastolic blood pressure and heart rate after inflating the LMA tube cuff. Therefore, the present study was conducted with the aim of comparing the effect of two methods of using lidocaine gel and lubricant gel during placement of a laryngeal airway mask on hemodynamics during orthopedic surgery.

Methods: This study was a double-blind randomized controlled clinical trial that was conducted during a one-year period from 2021 to 2022 in patients referred to Shahid Mohammadi Hospital for orthopedic surgery. Patients were randomly divided into two groups of 50 patients (lubricant gel group and lidocaine gel group during LMA operation). When the patient entered the operating room and was placed on the operating bed, the patient's vital signs including systolic, diastolic, mean arterial blood pressure and heart rate were checked before the start of anesthesia. The mentioned vital signs were checked before induction, one minute, five minutes, thirty minutes and upon entering the recovery room and recorded in the data collection form.

Results: The results showed that the studied groups did not have significant differences in terms of factors affecting the response to drugs such as age and gender. Also, hemodynamic changes in both groups were not statistically significant ($P>0.05$).

Conclusion: In terms of hemodynamic changes, the use of lidocaine gel during LMA operation in patients undergoing orthopedic surgery was not observed with the group using lubricant gel.

Keywords: Lidocaine Gel, Lubricant Gel, Laryngeal Mask, Hemodynamic Symptoms

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Introduction

Complications of intubation are almost common and include up to 4% of all patients (1). LMA is used to maintain the airway and spontaneous breathing or control during short-term surgeries (2). Also, it is used as the first choice during CPR in cases where the resuscitator does not have full skill in tracheal intubation (3). For patients who have problems with normal intubation or if intubation was impossible, this airway method is indicated, and compared to tracheal intubation, it is more tolerable in lower concentrations of anesthetic drugs and the possibility of airway edema is also lower. (4). Previous studies have shown that the use of LMA is usually accompanied by trauma to the pharynx and throat, dry mouth and harshness of voice (5 and 6). In general, it has been seen in practice that during surgery, after inflating the cuff of the LMA tube, patients experience hemodynamic changes in systolic and diastolic blood pressure and heart rate, or they may experience withdrawal reactions such as nausea after anesthesia; vomiting, cough and sore throat (7-10). In addition, in order to use the LMA in the patient's mouth, it is necessary to use a lubricant to facilitate the sliding of the tube in the mouth and its correct placement, which can be done using lidocaine gel or lubricant gel (11). On the other hand, one of the methods of pain control and reduction is the use of preferred analgesia, which actually consists of treating pain before it begins, and by means of which it is possible to reduce the intensity and duration of pain after surgery (12). It can be said that preferential analgesia is actually an anti-pain treatment that reduces the range of pain sensation by reducing central and peripheral sensitivity, on the other hand, this can be done peripherally or along the sensory axons and on the data. In different parts of the central nervous system (13). Considering the above, the present study was conducted with the aim of comparing the two methods of using lidocaine gel and lubricant gel while placing the laryngeal mask on the hemodynamics during orthopedic surgery in Bandar Abbas Shahid Mohammadi Hospital in 2020-2021

Method

The current study is a double-blind randomized controlled clinical trial that was conducted during a one-year period from 2020 to 2021 in patients referred to Shahid Mohammadi Hospital in Hormozgan for orthopedic surgery. The patients were selected by easy sampling from the available samples and randomly divided into two groups. The patients were assigned to study groups (50 patients in each group) using a table of random numbers. Before entering the patients in this study, the research process was explained and informed consent was obtained from them. In all stages of the study, researchers adhered to the principles of the Declaration of Helsinki and the confidentiality of patient information. The ethics code of this study was received by the Ethics Committee of Hormozgan University of Medical Sciences (IR.HUMS.REC.1400.301).

Inclusion criteria include; ASAI and II, patients who referred to Bandar Abbas Shahid Mohammadi Hospital for orthopedic surgery, all patients who have no systemic problems and are in general health, are patients with an age range of 18-70 years.

Exclusion criteria also include: patients who needed medication during surgery or measures other than routine care to eliminate complications and reduce pain, unstable hemodynamic status, patients who did not want to cooperate, patients who were allergic to lidocaine, patients with Kidney failure, patients with liver failure, patients who are addicted to drugs, patient's lack of consent to participate in the study, long-term use of beta-blocker, sedative, anti-depressant and analgesic drugs.

All patients who met the inclusion criteria at the time of the study, after obtaining written consent and explaining the conditions of the

study, were included in the study. 100 patients participating in the present study were divided into two intervention and control groups by random numbers table. Patients were transferred to the operating room for surgery and underwent general anesthesia with the same procedure and a specific surgical team. The person performing the procedures, the person collecting the information, and the patient were unaware of the type of gel used. Monitoring includes pulse oximeter and non-invasive measurement of blood pressure for patients, and blood pressure (systolic, diastolic) and heart rate of patients were recorded before anesthesia and laryngeal mask placement. Anesthesia was the same in both groups. All patients were injected with 5 cc/kg of Ringer's serum as a preload, and then anesthesia was performed by injecting 1-3 micrograms/kg of fentanyl, 0.5 mg/kg of atracroium, and 2-3 mg/kg of propofol. Anesthesia was continued by mask using N2O and 100% oxygen and then propofol 100mic/kg/min.

Patients into two groups; Lubricant gel (5 cc of lubricant gel) and lidocaine gel (5 cc of 2% lidocaine gel) were divided during LMA operation.

No premedication was given to the patients before entering the operating room. When the patients entered the operating room and placed on the operating bed, the patient's vital signs including systolic blood pressure, diastolic blood pressure, mean arterial blood pressure and heart rate were checked before the start of anesthesia. The mentioned vital signs were checked before induction, one minute, five minutes, thirty minutes and upon entering the recovery room and recorded in the data collection form.

After collecting the data, to evaluate the status of the two groups in terms of variables such as age and weight, using the chi-square test, and to evaluate the average changes in blood pressure and heart rate in the two groups, using the T-test and Repeated measures analysis. The direction of the changes that happened in the variables over time was done using spss software version 23. A significance level of $P<0.05$ was considered.

Results

In this study, 100 patients who were candidates for orthopedic surgery in Shahid Mohammadi Hospital in 2020-2021 were examined in two groups of 50 patients with lubricant gel and lidocaine gel. There were no significant differences between the two groups in terms of age and gender demographic variables (Table 1).

The average changes of systolic blood pressure in the intervention group (lidocaine gel) and the control group (lubricant gel) were not statistically significant ($p>0.05$), (Table 2).

The average changes of diastolic blood pressure variables in the intervention group (lidocaine gel) and the control group (lubricant gel) were not statistically significant ($p>0.05$), (Table 3).

The average changes of mean arterial pressure variable in the intervention group (lidocaine gel) and the control group (lubricant gel) are not statistically significant ($p>0.05$), (Table 4).

The average changes in the heart rate variable in the intervention group (lidocaine gel) and the control group (lubricant gel) are not statistically significant ($p>0.05$).

The average of systolic blood pressure, diastolic blood pressure, mean arterial pressure and heart rate before, 1 minute, 5 minutes, 30 minutes after the operation and upon entering the recovery in two control (lubricant gel) and intervention (lidocaine gel) groups. Analysis of variance test with repeated measurements design was used. The results showed that there is no statistically significant difference between the two control (lubricant gel) and intervention (lidocaine gel) groups in terms of oximeter, systolic blood pressure, diastolic blood pressure, mean arterial pressure and heart rate.

Discussion

The amount of changes in hemodynamic variables (systolic and diastolic blood pressure and heart rate) and pulse oximeter in the group using lidocaine gel and the group using lubricant gel were not statistically significant. One of the ways to reduce pain and related reactions is to create preferential analgesia through intervention in the pain transmission pathways, which can be done in different ways, including the use of local anesthetics, nerve block, epidural block, spinal anesthesia, intravenous injection of painkillers and anti-inflammatories (14). In Bourget's study, the use of preferred analgesia method in anorectal surgeries to reduce postoperative pain has also been proven (15). It has been shown in several studies that the use of LMA causes harshness of voice and hoarseness due to the trauma it inflicts on the pharynx (16). In justifying the mechanism of this phenomenon, it should be said that with the use of lidocaine gel as a lubricant, pain receptors are blocked and reactions caused by painful pressure on the pharynx and larynx are prevented, including hemodynamic changes, which is the preferred analgesia. In other words, by converting thermal, mechanical, and chemical energies into electrical activities, pain receptors transfer them to the posterior horn of the spinal cord, where there are two other categories of neurons called noticeptive specific pain neurons and wide dynamic range (WDR) neurons. Many chemical mediators such as amino acids glutamate and aspartate, N-methyl-D-aspartate (NMDA) and substance P are involved in the transmission of pain signals in these neurons of the posterior horn of the spinal cord, WDR neurons receive inhibitory and excitatory signals, in case of tissue damage caused by surgery. The signals related to pain receptors, after being created, cause a cascade of changes in the nervous system, including the increase in the response of peripheral and central neurons, continuous receiving of stimulation signals cause the memory of pain in a person. Preferential analgesia is actually a treatment that starts before the operation by inhibiting the receptivity of pain impulses by pain receptors, and its activity continues during the surgery and blocks various stages of transmission in pain receptors (17). The results of comparing our study with Riah's study showed that since in their method for LMA insertion, lubricant gel was used, which is in favor of the more effective method proposed in our study (18).

Conclusion

In terms of hemodynamic changes, the use of lidocaine gel during LMA operation in patients undergoing orthopedic surgery was not observed with the group using lubricant gel.

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Tables

Table 1: Demographic changes in the two study groups

Variable	lidocaine gel	lubricant gel	p-value
Age	41.20	40.24	0.883
Male	31	30	0.678
Female	19	20	

Table 2: Average systolic blood pressure changes in the two study groups

SBP	Groups	SD ± Mean	P-value
SBP before anesthesia	lubricant	14.11±2.126	0.81
	lidocaine	57.64±2.127	
SBP one minute after anesthesia	lubricant	08.46±2.123	0.109
	lidocaine	61.118±2	
SBP five minutes after anesthesia	lubricant	79.64±1.120	0.054
	lidocaine	20.10±2.115	
SBP thirty minutes after anesthesia	lubricant	95.95±1.120	0.289
	lidocaine	96.118±1	
SBP upon entering recovery	lubricant	37.45±2.123	0.110
	lidocaine	78.70±1.118	

Table 3: Changes in diastolic blood pressure in the two study groups

DBP	Groups	SD ± Mean	P-value
DBP before anesthesia	lubricant	51.86±1.75	0.194
	lidocaine	83.75±1.72	
DBP one minute after anesthesia	lubricant	44.97±1.75	0.481
	lidocaine	30.21±1.77	
DBP five minutes after anesthesia	lubricant	0.73±1.74	0.244
	lidocaine	31.64±1.72	
DBP thirty minutes after anesthesia	lubricant	18.83±1.75	0.912
	lidocaine	32.64±1.75	
DBP upon entering recovery	lubricant	17.77±1.92	0.121
	lidocaine	61.04±1.81	

Table 4: Mean arterial pressure changes in the two studied groups

MAP	Groups	SD ± Mean	P-value
MAP before anesthesia	lubricant	10.92±7.48	0.978
	lidocaine	91.20±6.49	
MAP one minute after anesthesia	lubricant	98.10±6.56	0.12
	lidocaine	61.66±6.57	
MAP five minutes after anesthesia	lubricant	45.75±7.64	0.442
	lidocaine	77.16±6.75	
MAP thirty minutes after anesthesia	lubricant	10.10±7.54	0.601
	lidocaine	70.22±6.59	
MAP before anesthesia	lubricant	90.40±6.66	0.72
	lidocaine	60.72±6.69	