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Effect of Local Application of Dexamethasone on Reducing of post-surgical Sore Throat due to application of Laryngeal Mask Airway

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ABSTRACT

This study investigated the local effect of Dexamethasone on sore throat after surgery using the LMA. This study is a double-blind randomized clinical trial conducted on 100 patients underwent general anesthesia who were candidates of placement of laryngeal mask airway. The patients were randomly assigned to two groups of 50. In the experimental group, Dexamethasone was applied to the cuff of the LMA and in the control group; distilled water was applied to the cuff. The rate of incidence and intensity of sore throat, prevalence of coughing, and hoarseness were assessed at 1, 2, and 24 hours after surgery. Data were analysed by t-test, Chi-Square test, and Fisher's Exact test. The incidence of sore throat during 24 hours after surgery was 8% in Dexamethasone group and 22% in distilled water group. The intensity of pain at the intended times after surgery significantly decreased in both groups (P=0.019). The prevalence of coughing showed a significant decrease at 1 h after surgery in both groups (P=0.025). The local application of Dexamethasone on the LMA cuff was effective on reducing the prevalence and acuity of sore throat after surgery. Regarding lack of any complications due to the use of Dexamethasone, it can be used to prevent the postoperative sore throat.

Key words: laryngeal mask airway, dexamethasone, sore throat, pain, post-surgery

1. INTRODUCTION

Sore throat is one of the common complications after surgery using the laryngeal mask airway and is considered as one of the patients' major problems after surgery (1). This complication leads to patients' ample distress, insomnia, and memory impairment. The incidence of sore throat during the placement (insertion) of the laryngeal mask airway is reported to be 34%-58% (1). Its incidence is related to various factors including age, sex, cuff size, duration of use, and the rate of manipulation during suction and the number of suction of secretions (2). The laryngeal mask is a device for controlling the supralaryngeal airway during anesthesia used to manage both the routine airway and difficult airway. Postoperative sore throat is one of the complications of the use of LMA. Some pharmacological and non-pharmacological methods have been offered to reduce the amount of sore throat after the use of the laryngeal mask airway. The non-pharmacological modes of reducing sore throat after surgery include: the use of a laryngeal mask of smaller size, treating the laryngeal mask with water-soluble lubricating gel, the insertion of laryngeal mask after obtaining complete muscular relaxation, and gentle suction of the patient's pharynx. The pharmacological methods include: inhalation of Beclomethasone, gargling with sodium Azolen sulphunate, and aspirin (3). Dexamethasone is a

strong glucocorticoid with analgesic and anti-inflammatory effects. There are some reports on the prophylactic effects of Dexamethasone on nausea and vomiting after surgery and its therapeutic effect on throat stinging after surgery (4). Some recent studies have shown that the intravenous administration of Dexamethasone before surgery decreases throat stinging significantly after surgery (5). Despite the management of pain in the surgical site, it is difficult to control sore throat with systemic analgesics. Hence, the use of local analgesics and the prevention of postoperative throat stinging are the subject of our study. Therefore, we decided to investigate the effect of local administration of Dexamethasone bolus on reducing sore throat after surgery using the laryngeal mask airway.

2. MATERIALS AND METHODS

This attempt is a double-blind randomized clinical trial conducted on 100 patients after obtaining the approval of Committee of Ethics and also informed written consent of each patient. Inclusion criteria included the patients candidated for surgery with the use of laryngeal mask airway and all underwent general anesthesia. Sample size was done with simple randomization. They were randomly assigned to two groups of 50: the experimental and control groups. Dexamethasone was introduced to the laryngeal mask airway cuff for the experimental group patients and distilled water was applied to the cuff for the control group patients. Patients with a history of sore throat and hoarseness before surgery, congenital and acquired laryngeal and pharyngeal deformities, drug addiction, neuropathic diabetes, history of anaphylactic sensitivity to glucocorticoid drugs, the use of laryngeal mask with a duration greater than 1.5 h, number of suctions of mucous secretions more than 3 times, cases of difficult insertion (placement), attempts for insertion of mask more than once, and traumatization of pharynx and larynx during insertion of mask were excluded from the study. The method of anesthesia was the same for all patients. To induce anesthesia, Propofol 2.5 mg/kg and fentanyl 2-3 µg/kg, and to produce muscular relaxation Atracurium 0.5 mg/kg were used. After the placement of the laryngeal mask airway, a mixture of 50% NO_2 and oxygen, and isoflurane MAC=1-1.2% was used to maintain anesthesia. $ETCO_2$ was kept in the range of 35-40. Demographic information of the patients including age, sex, and also the rate of incidence and acuity (intensity) of sore throat, incidence of coughing, and hoarseness was recorded before anesthesia. Additionally, the rate of incidence and intensity of sore throat, incidence of coughing, and hoarseness was recorded at 1, 2, and 24 h after surgery. The collected data were analyzed using statistical tests. Data were analysed by t-test, Chi-Square test, and Fisher's Exact test.

3. RESULTS AND DISCUSSION

Our findings showed that in the experimental group, 42% of the patients were males and 58% were females. Also, in the control group, 50% were males and 50% were females. So, there was no significant difference between the two groups regarding sex (P=0.422). Furthermore, the mean age of the patients in the experimental and control groups was 46.9±9.75 and 45.96±11.4 years, respectively with no significant difference between the two groups in this regard (P=0.659). The duration of mask use was 24.6±17.6 min in the experimental group and 30±19.4 min in the control group, the difference not being significant (P=0.148) (Table 1).

Table 1 . Mean duration of the use of laryngeal mask in the samples under study

Group	Dexamethsone		control		
Time	mean	SD	mean	SD	P-vaule
Use of LMA(min)	24.6	17.6	30	19.4	0/148
t-test					

According to Table 2 , the mean score of sore throat was 0.12±0.48 in the experimental group and 1.12±2.28 in the control group 1 h after surgery (P=0.025).

Table 2 .Mean score of intensity of sore throat at 1, 2, 24 h after the removal of laryngeal mask in the two groups under study

Groupe	Dexamethsone		control		P value
Sore throat	mean	SD	mean	SD	
1 hour	0.12	0.47	1.12	2.28	0.025
2 hour	0.16	0.548	1.28	2.44	0.029
24 hour	0.08	0.39	0.62	1.35	0.019
t-test					

Also, the mean score of sore throat 2 h after the removal of laryngeal mask was 0.16±0.55 in the experimental group

and 1.28±2.44 in the control group (P=0.029). Further, the mean score of sore throat 24 h after the removal of laryngeal mask was 0.08±0.39 in the experimental group and 0.62±1.35 in the control group (P=0.019), the difference being statistically significant. Additionally, frequency of coughing 1 h after surgery was 4% in the Dexamethasone group and 18% in the control group, the difference between the two being statistically significant (P=0.025). Frequency of coughing 2 h after surgery was 2% in the Dexamethasone group and 6% in the control group, the difference between the two not being statistically significant (P=0.617). Moreover, there was only one case of coughing 24 h after surgery (Table 3).

Table 3 . Frequency distribution of coughing at 1, 2, and 24 h after the removal of laryngeal mask in both groups under study

Groupe	Dexamethsone		control		P value
cough	yes	no	yes	no	
1 hour	2(4%)	48(96%)	9(18%)	41(91%)	0.025
2 hour	1(2%)	49(98%)	3(6%)	47(97%)	0.617
24 hour	0	50(100%)	1(2%)	49(99%)	1
Fisher's Exact test					

Frequency of hoarseness 1 h after surgery was 2% in the Dexamethasone group and 12% in the control group; yet, the frequency of coughing 2 h after surgery was 4% in the Dexamethasone group and 12% in the control group. Also, the frequency of hoarseness 24 h after surgery was 2% in the Dexamethasone group and 4% in the control group. These differences were not statistically significant with P=o.112, P=0.269, and P=1, respectively (Table 4).

Table 4 . Frequency distribution of hoarseness at recovery, 2, and 24 h after the removal of laryngeal mask in the two groups under study

Groupe	Dexamethsone		control		P value
Hoarseness	yes	no	yes	no	
1 hour	1(2%)	49(99%)	6(12%)	44(96%)	0.112
2 hour	2(4%)	48(98%)	6(12%)	44(96%)	0.269
24 hour	1(2%)	49(99%)	2(4%)	48(98%)	1
Fisher's Exact test					

The findings of our study revealed that the mean score of pain intensity at 1, 2, and 24 h after surgery was significantly less for the experimental group in which LMA was treated with Dexamethasone compared to the control group. Also, the incidence of coughing in the experimental group 1 h after surgery was significantly smaller compared to the control group. Nonetheless, there was no significant difference between the two groups regarding the incidence of coughing at 2 and 24 h after surgery. Besides, there was no significant difference between the two groups regarding hoarseness after surgery. The study by Thomas et al. investigated the effect of Dexamethasone on reducing sore throat intensity after surgery. Their findings showed that there was a statistically significant decrease in the mean score of sore throat intensity at 1, 3, 6, 12, and 24 h after surgery following the removal of the intra-tracheal tube in patients who received 8 mg of intravenous Dexamethasone compared to the patients who received 2 ml of intravenous normal saline solution (6). They found that the administration of Dexamethasone before surgery reduced sore throat due to tracheal intubation, this being consistent with our findings. Furthermore, Bagchi et al. reported in their study that the administration of intravenous Dexamethasone reduced the incidence of sore throat at 1, 6, and 24 h after surgery. It should be noted that in Thomas' and Bagchi's studies, Dexamethasone was administered intravenously, while in our study, Dexamethasone was applied to LMA. Yet, despite the difference, our study demonstrated that the local administration of Dexamethasone is also effective in reducing sore throat. Furthermore, the rate of incidence of coughing in the patients in the Dexamethasone group decreased at 1, 6, and 24 h after the removal of the tube, yet, the incidence of hoarseness was not significantly different between the two groups as was the case in our study (2). Most studies have dealt with the study of the effect of intravenous administration of Dexamethasone on sore throat due to intra-tracheal tube (7-11). A few studies have focused on LMA complications and also on the effect of the local administration of glucocorticoids on sore throat and coughing after surgery. Sumathi conducted a comparative study of effect of the application of Bethametasone gel and lidocain gel on reducing sore throat, coughing, and hoarseness after surgery. The findings indicated that the application of Bethametasone gel on the intra-tracheal tube leads to a reduction in the incidence and intensity of sore throat, coughing, and hoarseness. Of course, Sumathi studied the effect of Bethametasone, while we investigated the effect of Dexamethasone. Their findings were consistent with ours, yet, regarding

hoarseness, they were not consistent with ours. This lack of consistency of findings may be due to the fact that in Sumathi's study, Bethametasone gel was in contact with the vocal cords, influencing them while in our study, only the laryngeal space was in contact with Dexamethasone (12). Moreover, Tabari et al. compared the effect of the application of Bethametasone gel on the intra-tracheal tube and the intravenous administration of Dexamethasone on reducing sore throat after surgery. Their findings revealed that the application of Bethametasone gel decreased the intensity of postoperative sore throat to a higher degree compared to the intravenous Dexamethasone (13). Our findings along with those of Sumathi indicated that glucocorticoids when applied to the cuff of the LMA induces a greater effect on reducing the sore throat caused by intra-tracheal tube and LMA, this being related to the direct contact of the drug with the posterior pharyngeal wall, vocal cords, and larynx. This finding is approved by Ayob et al. and Selvaraj et al. (14, 15).

4. CONCLUSION

Based on the findings of this study and the results of similar studies, it can be concluded that the application of Dexamethasone before surgery can decrease the incidence of the complications of the laryngeal areas due to the placement of laryngeal mask airway and tracheal intubation. Of course, since in our study the plasma concentration of Dexamethasone was not measured, the systemic or local effect of Dexamethasone on reducing the laryngeal complications could not be investigated. It is recommended that future studies focus on measuring the amount of plasma concentration of Dexamethasone in local and systemic administration and also its effect on the LMA complications. Also, more samples need to be assessed.

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AUTHORS CONTRIBUTION

This work was carried out in collaboration among all authors.

CONFLICT OF INTEREST

The authors declared no potential conflicts of interests with respect to the authorship and/or publication of this article.

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