



ORIGINAL ARTICLE

Preemptive Effect of Two Different (Intracuff and Intravenous) Routes of Dexamethasone Administration on Postoperative Sore Throat and CoughNedasadat Mansouritehrani^{1*}¹ School of Medicine, Isfahan University of Medical Sciences, Isfahan, Iran* Corresponding Author: Nedasadat Mansouritehrani, Email: mtns94@gmail.com

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ABSTRACT

Introduction: The most common complications following anesthesia intubation include postoperative sore throat, post-extubation cough, and hoarse voice. Currently, the use of preoperative Dexamethasone has been effective in controlling these complications. Therefore, the present study aimed to compare the preemptive effect of intracuff and intravenous routes of Dexamethasone administration for postoperative sore throat and cough. **Materials and Methods:** In the present clinical trial, 96 patients who underwent general anesthesia intubation were randomly assigned to three groups. The first group received 4 mg intracuff Dexamethasone, the second group received 4 mg intravenous Dexamethasone, and the third group was administered a placebo. Cough frequency and severity of a sore throat after extubation were investigated in the three groups. **Results:** Any significant difference was not observed among the three groups regarding hemodynamic variables ($P>0.01$); however, the incidence of cough was significantly lower in all the three groups ($P<0.01$). Also, the average severity of a sore throat in PAR and 1 h after surgery in the three groups was significantly lower ($P<0.05$). Moreover, no difference was detected in the groups regarding the severity of a sore throat within 24 h post-surgery ($P>0.01$). **Conclusion:** The use of two methods of intravenous and intracuff Dexamethasone administration before surgery reduced the incidence of postoperative cough and the severity of sore throat in patients.

INTRODUCTION

Postoperative sore throat, post-extubation cough, and hoarse voice are the most common complications of general anesthesia produced using endotracheal intubation. The incidence of these complications has been reported to be between 30% and 81% (1-4). In addition, the incidence of postoperative sore throat is between 14.4% and 50% (5, 6). These complications lead to anxiety and dissatisfaction in patients after surgery (7). In order to minimize the incidence and severity of these complications, various methods such as licorice gargle, fluticasone propionate inhalation, aspirin and benzydamine hydrochloride gargle, lidocaine spray, intracuff diluted lidocaine, magnesium, stellate ganglion block, and Dexamethasone and lidocaine injection have been used for controlling complications (4, 7-9). Despite their efficiency in reducing postoperative airway symptoms, these methods cause the same complications in patients due to their limited accessibility (8). The cuffed tracheal tube, lubricants used on the tracheal tube, cuff pressure, and

various other factors can affect the incidence and severity of postoperative sore throat and cough (10). The etiology of postoperative cough is partially attributed to the stimulation and inflammation of mucus and airway mucus induced by tracheal tube; therefore, local anesthesia of mucus secretion increases the tolerance of tracheal tube during its contact with mucus (11). The administration of intravenous Dexamethasone is simple, effective, and available in the operating room. Preemptive Dexamethasone administration before anesthetic induction decreases the severity of postoperative sore throat (12, 13). In addition, the efficacy of intravenous Dexamethasone in reducing the probability of occurrence and severity of postoperative airway symptoms has been well-documented (14). Hitherto, the effect of intravenous and intracuff Dexamethasone administration on postoperative sore throat and cough has been assessed. However, since the preemptive effect of the two different routes of Dexamethasone administration (i.e., intravenous and intracuff) has been compared in only a few studies, the present study aimed to provide further insights with respect to the preemptive effect.

MATERIALS AND METHODS

This randomized, double-blind, clinical trial was performed on 96 patients who visited Al-Zahra Hospital in 2017-2018 and received general anesthesia using intubation and laryngoscopy. The inclusion criteria were as follows: patients were given general anesthesia by intubation and laryngoscopy, age range 18–65 years, ASA score 1 and 2, mouth openness >3.5 cm, and consent to participate in the study. Patients with a preoperative sore throat, asthma, hoarse voice, history of respiratory tract infection or sore throat in 2 weeks before surgery, history of cigarette smoking, history of taking analgesics or steroids in 12 h before surgery, and allergic to Dexamethasone were not included in the study. The patients were also excluded if the duration of the operation lasted for >300 min, more than one attempt was made for tracheal intubation, the method of anesthesia was altered for any reason, and the patient required postoperative mechanical ventilation in the intensive care unit.

After random selection using Random Allocation Software, the patients were divided into three groups: Groups 1, 2 and 3. In Group 1, before intubation, 4 mg intracuff Dexamethasone was administered in order to moisten the tracheal cuff wall. During intubation, it was reloaded into the sterilized syringe, and after intubation, it was re-injected into the cuff. Moreover, 4 mg intravenous normal saline was administered to the patient (15). In Group 2, before intubation, 4 mg Dexamethasone was administered intravenously to the patient, and 4 mg saline was injected into the tracheal tube cuff. During intubation, it was reloaded into the sterile syringe, and after intubation, it was again injected into the tracheal cuff (16). In Group 3 or placebo group, before intubation, the tracheal cuff wall was moistened with normal saline; in addition, 4 mg intravenous normal saline was administered. Notably, the anesthesiologist, surgeon, and person collecting information were unaware of the implementation of this study, and Dexamethasone and normal saline were numbered in pre-filled syringes and provided to the anesthesiologist.

The anesthetic induction method was the same in the three groups. Tracheal intubation was performed through the mouth and after the anesthesiologist ensured adequate muscle relaxation for tracheal intubation. Supra cuffed tracheal tube (with high-volume low-pressure cuff) with an internal diameter of 8-7 mm was used for tracheal intubation. The cuff pressure was maintained at 20 cm of water using a special manometer. Finally, surgical muscle relaxation was treated with atropine 0.02 mg/kg and neostigmine 0.04 mg/kg. On complete awakening, the patient was extubated and transferred to post-anesthesia care unit (PACU).

In this study, hemodynamic changes in the patients including systolic and diastolic blood pressure and heart rate at 4 different time points in perioperative period, i.e., before anesthesia, 3 min after tracheal intubation, 15 min after tracheal intubation, and 3 min after the tracheal extubation

was measured by a third person (nurse) who was unaware of the study. At the end of the surgery, trachea suction was performed slowly on the patient, and the tracheal tube was removed after the cuff deflation, and the patient had adequate pulmonary ventilation with arterial oxygen saturation >95%. The tracheal intubation time (from intubation to extubation) was also measured and recorded by a third person (nurse). Also, the duration, the start, and end time of the operation were recorded.

The incidence of cough frequency after tracheal extubation was recorded in PAR via observation by a third person (nurse) who was unaware of the drug type administered to the patient. In this study, the severity of sore throat was recorded via the visual analog scale (VAS) and by the patient at the time he was in PACU, and after 1 and 24 h. In the VAS scale, 0 indicates the lack of sore throat and 10 indicates severe sore throat. Moreover, the patient scored his sore throat within the range of 0–10. Moreover, Dexamethasone side effects such as psychiatric disorders, blurry vision, and digestive disorder were also documented by a third person (nurse).

Statistical analysis: The confidence level and power of statistical test were 0.95 and 0.80, respectively, for $z_{(1-\alpha/2)}$. Moreover, $[z]_{(1-\beta)}$ from standard normal distribution is 1.96 and 0.84, respectively, and ES indicates Cohen's effect size, which is 0.7 in the present study. Therefore, the sample size was 32 patients in each group. Data were collected and entered into SPSS 22. Chi-Square and one-way ANOVA tests were used to compare the groups. Moreover, repeated measure ANOVA was used to determine the changes in data at different time points. P-value<0.05 was considered as statistically significant.

RESULTS

In the present study, since the patients fulfilled the inclusion criteria, none were excluded from the study. The patients were divided into three groups: the first was intracuff group (14 females and 18 males), the second was an intravenous group (15 females and 17 males), and the third was control group (17 males and 15 females). No significant difference was detected among the groups with respect to demographic information such as age and gender ($P > 0.05$). In addition, no significant difference was observed between groups regarding systolic blood pressure, diastolic pressure, and heart rate before anesthesia, 3 min and 15 min after tracheal intubation, and 3 min after tracheal extubation ($P > 0.05$). However, according to the repeated measure ANOVA, changes in systolic and diastolic blood pressure and heart rate were significant in the three groups at the time points mentioned above ($P < 0.001$). Moreover, no significant difference was observed among the groups regarding the intubation time ($P = 0.68$) (Table 1).

The incidence of patient's cough was recorded by the nurse in PAR; it was significantly lower in the first, second,

Table 1. Demographic and clinical information of patients in three groups

Variable		Group 1	Group 2	Placebo	P-value
Gender	Male	(43.8%) 14	(56.3%) 18	(53.1%) 17	0.58
	Female	(56.3%) 18	(43.8%) 14	(46.9%) 15	
Systolic blood pressure (mmHg) (mean±SD)	Before anesthesia	123.90±25.43	119.64±22.30	116.38±21.19	0.43
	3 min after intubation	127.61±26.84	128.58±18.86	118.48±13.94	0.12
	15 min after intubation	117.96±31.24	121.13±22.20	110.46±19.87	0.25
	3 min after extubation	115.69±31.14	114.27±20.30	108.74±18.69	0.53
Diastolic blood pressure (mmHg) (mean±SD)	Before anesthesia	77.87±19.17	74.37±17.91	74.96±11.93	0.67
	3 min after intubation	78.75±17.50	81.87±15.99	77.25±16.21	0.52
	15 min after intubation	72.15±13.43	76.34±13.63	69.81±18.54	0.23
	3 min after extubation	61.15±16.36	61.53±15.75	57.87±13.50	0.57
Heart rate (n/min) (mean±SD)	Before anesthesia	82.62±17.67	81.53±18.01	80.37±15.75	0.87
	3 min after intubation	89.06±16.83	90.50±19.20	85.68±17.16	0.54
	15 min after intubation	87.12±17.60	86.81±18.75	84.75±18.05	0.85
	3 min after extubation	85.56±18.45	86.34±18.47	84.28±18.21	0.90
Duration of anesthesia with intubation (min) (mean±SD)		55.46±11.59	57.03±12.23	58.43±16.67	0.68

Abbreviations; min: minute, SD: standard deviation, mm Hg: millimeters of mercury

and control groups ($P=0.03$), respectively. The mean of sore throat severity or VAS was significantly lower in the first, second, and placebo groups in PAR and 1 h after the operation ($P<0.05$). However, no significant difference was detected among groups in terms of VAS at 24 h after the

operation ($P=0.15$). According to the repeated measure ANOVA, changes in VAS were significant at all time points in the three groups ($P<0.001$); no adverse side effects were observed in the groups in this study (Table 2).

Table 2. Frequency of cough and sore throat

Variable		Group 1	Group 2	Placebo	P-value
Frequency of cough in recovery	Male	(9.4%) 3	(15.6%) 5	(34.4%) 11	0.03
VAS (mean±SD)	Immediate after entry in recovery	4.09±1.32	5.25±2.32	6.65±2.13	0.001>
	1 h later	2.12±1.31	3.46±1.95	5.84±2.03	0.001>
	24 h later	0.34±0.78	0.40±0.91	0.78±1.18	0.15

Abbreviations; VAS: visual analog scale, SD: standard deviation

DISCUSSION

Based on the results of this study and given the effect of intravenous and intracuff Dexamethasone administration on hemodynamic variables, no difference was detected between the two methods of administration. The frequency of cough and the severity of sore throat in the groups with intravenous and intracuff. Dexamethasone administration were less than those in the placebo group. Typically, both intravenous and intracuff methods are effective and did not exhibit severe

side effects in controlling postoperative sore throat and cough in patients undergoing general anesthesia with intubation. Studies have examined intravenous and intracuff methods of Dexamethasone administration in postoperative cough, but none of the studies have compared these two methods. To the best of our knowledge, this is the first study to compare intravenous and intracuff Dexamethasone administration along with a placebo group. Some results of the

study by Lee et al. were consistent while some were inconsistent with our findings. Lee et al. examined the effect of intravenous 0.1 and 0.2 mg Dexamethasone on the incidence of preoperative sore throat. They concluded that 6 and 24 h after extubation, the incidence of sore throat in the group receiving 0.1 mg/kg/h Dexamethasone was less than the group receiving 0.2 mg/kg. They also found that the incidence of sore throat was less in both groups than that in the placebo group.

Moreover, only a small number of subjects that received 0.1 and 0.2 mg/kg Dexamethasone had an average (moderate) sore throat severity at 1 and 24 h post-extubation. The incidence of hoarse voice at 1, 6, and 24 h after extubation was significantly lower in the group receiving 0.2 mg/kg Dexamethasone than in the placebo group. However, no significant difference was detected among the three groups regarding the incidence of postoperative cough (6). Kim et al. examined the effect of Dexamethasone (10 mg intravenous administration) as prophylaxis for the reduction of postoperative sore throat in 70 patients. They concluded that 1 and 6 h after the surgery, the mean score of postoperative sore throat severity in the group that received Dexamethasone before surgery was significantly lower than those who received Dexamethasone after intubation. However, no significant difference was detected regarding the score of sore throat between the two groups at 24 h after surgery (2). In another study consistent with the present study, 8 mg intravenous Dexamethasone was used, and the incidence of sore throat in the Dexamethasone group was significantly lower (22.4%) than that in the control group (57.5%) at 24 h. Moreover, the severity of postoperative sore throat based on VAS at 1, 3, 6, 12, and 24 h after surgery was significantly lower in the Dexamethasone group than in the control group (17). Some studies were conducted to study the effect of Dexamethasone and lidocaine combination on the complications of intubation after surgery. The study by Refiei et al. was inconsistent with the current study as it compared three drugs of intracuff saline, Dexamethasone, and lidocaine with respect to the complications of intubation. Consequently, a difference was noted among the three groups of drugs regarding the incidence and the severity of cough, and lidocaine reduced the incidence of cough while Dexamethasone reduced the severity of the cough. Moreover, no significant difference was detected among the groups regarding the hemodynamics (15). The study by Ruangsri et al., which is inconsistent with the current study, reported that intravenous Dexamethasone did not exert a significant effect on postoperative sore throat (18).

Another study that was consistent with the present study concluded that both intracuff lidocaine and Dexamethasone significantly reduce postoperative sore throat and cough (19). The study by Choubsaz et al., which was inconsistent with our study, examined the effect of adding Dexamethasone to 2% lidocaine on the reduction of postoperative complications after general anesthesia. In the present study, the patients were divided into four groups: the first group received 2% lidocaine, the second group received 4 mg

Dexamethasone, the third group received 2% lidocaine and 4 mg Dexamethasone, and the fourth was placebo group. Based on the results of the study, a significant difference was detected in the heart rate among the Dexamethasone and Dexamethasone-lidocaine with the placebo groups. In addition, the heart rate in the Dexamethasone group and Dexamethasone-lidocaine group was significantly lower than that in the placebo group. Moreover, a significant difference was observed in the sore throat among the groups, and the incidence of sore throat in the Dexamethasone-lidocaine group was higher than that in the other groups, while that in the lidocaine group was lower than that in the other groups. Also, Dexamethasone does not affect the reduction in postoperative respiratory complications (10).

CONCLUSION

According to the results of this study, the use of two methods of preoperative intravenous and intracuff Dexamethasone reduced the amount of postoperative cough and the severity of sore throat in patients. Moreover, these methods do not have a significant effect on hemodynamic variables and do not cause severe side effects. Nevertheless, this study had some limitations, such as lack of a specific criterion for assessing the severity of the cough. Therefore, additional studies with larger sample size are needed to substantiate the current findings.

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