

# The effect of adding dexamethasone to intracuff lidocaine 2% on decreasing the respiratory complications after general anesthesia: a randomized, double blind, clinical trail

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## ABSTRACT

Postoperative sore throat and other airway morbidities are common and troublesome after endotracheal intubation general anesthesia. The aim of this study was to evaluate the effect of dexamethasone added to intracuff lidocaine on decreasing the respiratory complications after general anesthesia. In a retrospective study, 207 patients that were under general anesthesia and scheduled for tracheal intubation, randomly divided to four groups based on endotracheal tube cuff filling (48 patients with air (group A), 52 patients with lidocaine 2% (group L), 54 patients with dexamethasone 4mg (group D) and 53 patients with lidocaine 2% plus dexamethasone 4mg (group LD)). Chi-square test used to compare two categorical variables or T-test for to compare the means in two variables. P-value<0.05 was statistically significant. There was significant different for heart rate between group D and group LD compared to group A. Therefore, heart rate in group d and group LD was lower than group A. There was significant different for sore throat between group D and group L with group A, group L and group LD with group D and also group L with group LD. Therefore, sore throat in group LD was higher than other groups and group L was lower than other groups (P<0.05). Lidocaine alone has maximum of pain relief in the patients and dexamethasone alone inside endotracheal tube cuff increases pain. Dexamethasone added to intracuff lidocaine has no beneficial effect on decreasing the respiratory complications after general anesthesia.

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## INTRODUCTION

General anesthesia and surgery are the main causes of postoperative respiratory complications and increasing the understanding of the underlying causes of respiratory complications and developing early treatment strategies will likely provide improved benefits (Ferreira *et al.*, 2009). Using cuffed endotracheal tubes is a standard for general anesthesia. However, tracheal tube cuff pressure would cause a range of complications in tracheal mucosa (Rafiei *et al.*, 2012). Postoperative sore throat and other airway morbidities are common and troublesome after endotracheal tube intubation

general anesthesia (Lam *et al.*, 2015). Sore throat is reported between 30% and 70% of patients after tracheal intubation. The likelihood of a sore throat varies with the type, diameter, and cuff pressure of the endotracheal tube used. If intubation is essential, it may be helpful to give drugs prophylactically to alleviate postoperative sore throat (Tanaka *et al.*, 2015). During emergence from general anesthesia, patients may experience vigorous coughing, agitation or restlessness which might increase intracranial, intra-thoracic or intra-abdominal pressure, resulting in bronchospasm, wound dehiscence, and bleeding (Bidwai *et al.*, 1979).

Other laryngeal complication such as hoarseness, dysphonia, or dysphagia was also noted during the postoperative care (Estebe *et al.*, 2005). Lidocaine intravenous or topical administration was effective in reducing postoperative respiratory complications after short-term laryngeal surgery by way of rigid

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laryngoscope (Kocamanoglu *et al.*,2006). Also, dexamethasone is a potent corticosteroid with analgesic, anti-inflammatory, and antiemetic properties that preoperative IV dexamethasone has been reported to reduce the incidence of postoperative pain and swelling following oral surgeries (Biro *et al.*, 2005). The aim of this study was to evaluate the effect of dexamethasone added to intracuff lidocaine on decreasing the respiratory complications after general anesthesia.

## MATERIALS AND METHODS

This study was approved by Kermanshah University Ethics Committee, and was registered at <http://www.irct.ir> (registration number IRCT138711111617N1). In a retrospective study, 207 patients (range, 18-60 years) that classified as ASA class I and II scheduled for tracheal intubation in patients undergoing elective surgery under general anesthesia and also randomly divided to four groups based on endotracheal tube cuff filling (48 patients with air (Group A or control), 52 patients with 5cc lidocaine 2% (Group L), 54 patients with 1cc dexamethasone 4mg (Group D) and 53 patients with 4cc lidocaine 2% plus 1cc dexamethasone 4mg (Group LD)). After returning of breathing and then tracheal extubation, cough, nausea, vomiting, laryngospasm and bucking were checked in all patients for one hour. After 24 hours, sore throat based on VAS pain was checked that our patients scored pain as no pain if pain was 0 mild if pain was 1-4, moderate if pain was 5-7 and severe if pain was 8-10 (Chow *et al.*,2006) using a 4-point verbal rating scale: 0 = none (negative response to questioning); 1 = mild pain (pain reported only in co-response to questioning without any behavioral signs); 2 = moderate pain (pain reported in response to questioning and

accompanied by behavioral signs or pain reported spontaneously without questioning); and 3 = severe pain (strong vocal response or response accompanied by facial grimacing, arm withdrawal, or tears) (Agarwal *et al.*,2004). The correlation between the variables was checked by SPSS software v.19 (Chi-square test used to compare two categorical variables or T-test for to compare the means in two variables) and a p-value equal than 0.05 was considered as statistically significant.

## RESULTS

Out of 207 patients, the mean age was 40.04(±16.36) years, 38.61(±16.36) years, 40.04(±19.24) and 38.43(±18.02) for group A, group L, group D and group LD, respectively (**Table 1**). Also, male/female ratio was 19/29 for group A, 14/38 for group L, 27/27 for group D and 17/36 for group LD. The man BMI for group A, group L, group D and group LD was 22.25±0.74, 22.26±1.0, 21.89±0.86 and 22.13±0.65, respectively. There were no significant between-group differences for age or sex and BMI. The **Table 2** shows the correlation between adverse effects in three groups compared to group A. There was significant different for heart rate between group D and group LD compared to group A (P<0.05). Therefore, heart rate in group d and group LD was lower than group A. There was significant different for sore throat between group D and group L with group A, group L and group LD with group D and also group L with group LD. Therefore, sore throat in group LD was higher than other groups and group L was lower than other groups (P<0.05). There was no significant different between vomiting, cough, nausea, bucking and laryngospasm in the groups (P>0.05).

**Table 1:** Demographic and clinical characteristics of the study population (N = 207)\*

Variables	Group A N=48	Group L N=52	Group D N=54	Group LD N=53
Age (mean±SD), year	40.04±16.84	38.61±16.36	40.40±19.24	38.43±18.02
Sex				
Male	19	14	27	17
Female	29	38	27	36
BMI (mean±SD)	22.25±0.74	22.26±1.0	21.89±0.86	22.13±0.65

\* No significant between-group differences were found. A: Air, L: Lidocaine, D: Dexamethasone, LD: Dexamethasone plus Lidocaine, BMI: Body mass index

**Table 2:** The correlation between adverse effects after anesthesia in 3 groups (Lidocaine, Dexamethasone and Dexamethasone plus Lidocaine) compared to control group (Air)

Adverse effect	Group A N=48	Group L N=52	Group D N=54	Group LD N=53
<b>Cough</b>				
Yes	10	9	16	9
No	38	43	38	44
Heart rate (mean±SD)	81.52±16.61	76.88±15.12	71.16±9.52 <sup>‡</sup>	72.81±11/87 <sup>‡</sup>
<b>Nausea</b>				
Yes	2	2	5	2
No	46	50	49	51
<b>Vomiting</b>				
Yes	3	1	2	4
No	55	51	52	49
<b>Bucking</b>				
Yes	12	17	9	14
No	36	35	45	39
<b>Laryngospasm</b>				
Yes	1	0	3	1
No	47	52	51	52
Sore throat *(mean±SD)	1.106±1.14	1.039±1.24 <sup>‡‡</sup> °	1.88±1.28 <sup>‡</sup>	1.096±1.15 <sup>‡</sup>

\*Based on Visual Analog Scale for Pain (VAS pain) <sup>‡</sup>P<0.05versus group A, <sup>‡‡</sup>P<0.05versus group D, <sup>°</sup>P<0.05versus group LD. A: Air, L: Lidocaine, D: Dexamethasone, LD: Dexamethasone plus Lidocaine.

## DISCUSSION

The results indicated both the topical and systemic lidocaine therapy to significantly reduce the risk of postoperative sore throat (Tanaka *et al.*, 2009). A review study with nineteen trials, which comprised 1566 patients showed that both alkalized and non-alkalinized intracuff lidocaine may prevent and alleviate postoperative sore throat (POST) and postintubation-related emergence phenomena (Lam *et al.*, 2015). In another study (Singh *et al.*, 2007), was reported that use of saline or 2% lidocaine as a liquid media for filling the ETT cuff reduced postoperative sore throat and thereby tracheal morbidity. Likewise, a research (Wetzel *et al.*, 2008) injected 4% lidocaine into the ETT cuff to reduce post-extubation reactions. Also, a study (Fagan *et al.*, 2000) suggested that inflating the ETT cuff with lidocaine rather than air can reduce the incidence of post-extubation cough. In our study, there was no significant different for cough after anesthesia between control group (air) and lidocaine group ( $P>0.05$ ), but sore throat reduced significant with lidocaine therapy compared to control group ( $P<0.05$ ).

Pretreatment with dexamethasone was more effective than saline and had a similar efficacy as lidocaine prior to propofol injection. Since dexamethasone is commonly used to prevent postoperative nausea and vomiting and to improve post-surgical recovery, clinical practitioners should consider using dexamethasone preoperatively to minimize propofol-induced vascular pain and its undesirable side effects (Ahmad *et al.*, 2013). In a double-blind clinical trial (Rafiei *et al.*, 2012), patients were randomly allocated into normal saline, lidocaine, and dexamethasone groups. The three drugs were not significantly different in attenuating post-extubation reactions such as hoarseness, sore throat, and laryngospasm. However, lidocaine was more effective on cough incidence while dexamethasone had better efficacy in reducing cough severity. In our study, there was no significant different between adding lidocaine or dexamethasone for endotracheal tube cuff filling compared to air group in reducing cough, nausea or vomiting ( $P>0.05$ ). Although, lidocaine was more effective on cough incidence compared to dexamethasone, but this different was no significant in two groups. Addition of dexamethasone to local lidocaine infiltration effectively decreases the incidence and severity of back pain after combined spinal-epidural anesthesia implemented for gynecological surgery (Gao *et al.*, 2015). A study reported that combination lidocaine 20 mg and dexamethasone 6 mg, with venous occlusion for 1 minute, was more effective than lidocaine 20 mg or dexamethasone 6 mg alone for pain control during propofol injection in these Korean patients (Kwak *et al.*, 2008). In other study (Bigat *et al.*, 2006), patients in group LD (3 mg/kg lidocaine + 8 mg dexamethasone) had significantly lower pain scores and required less acetaminophen in the first 24 h after surgery and in conclusion, the addition of 8 mg dexamethasone to lidocaine for IV regional anesthesia in patients undergoing hand surgery improves postoperative analgesia during the first postoperative day. In this study, adding lidocaine 2% to

dexamethasone 4 mg, reduced sore throat more than group D but lidocaine 2% alone reduced the pain more than group LD, control group and group D ( $P<0.05$ ). Therefore, lidocaine 2% was more effective than combination of lidocaine 2% or dexamethasone 4 mg, dexamethasone 4 mg alone or air in reducing of pain (sore throat) in general anesthesia.

A study (El Batawi, 2013), reported that in the patients under general anesthesia, lidocaine reduced heart rate that our study confirmed these results, but Gaumann *et al.* (1992) reported patients under general anesthesia who had received lidocaine had no significant rise in heart rate from baseline following the introduction of the rigid bronchoscope. Other study (Yaghoobi *et al.*, 2013), reported that after anesthesia, combination of lidocaine to dexamethasone reduced heart rate compared to dexamethasone alone but different was no significant that our study confirmed it. In this study, adding dexamethasone alone or combination dexamethasone and lidocaine to tube cuff reduced heart rate after anesthesia compared to control group ( $P<0.05$ ), but no for lidocaine alone. Therefore, dexamethasone has more affection on reducing of heart rate in general anesthesia compared to lidocaine.

## CONCLUSION

Lidocaine alone has maximum of pain relief in the patients and dexamethasone alone inside endotracheal tube cuff increases pain. Dexamethasone added to intracuff lidocaine has no beneficial effect on decreasing the respiratory complications after general anesthesia.

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Trial registration for this trial is: IRCT13871111617N1.

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