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Comparative study of intra cuff dexamethasone and lidocaine on post-extubation reactions, A randomized controlled trial array antenna

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Abstract
Background: The most common complications after tracheal intubation during general anesthesia are sore throat, hoarseness, and laryngospasm which can cause severe discomfort to patients. Several methods have been suggested to prevent these complications. In this study, the effects of intracuff dexamethasone, lidocaine, and normal saline in reducing post-extubation reactions were compared.
Methods: This double-blind clinical trial was performed on 240 men of ASA (American Society of Anesthesiologists) class I or II who underwent general anesthesia for elective procedures in KVG medical college and hospital , Sullia during 2017-18. Depending on the kind of drug used to fill the endotracheal tube (ETT) cuff, patients were randomly allocated into normal saline, lidocaine, and dexamethasone groups. Post-extubation reactions were then evaluated in all groups.
Results: The groups were demographically comparable. There were no significant differences between the three groups regarding post-extubation sore throat, hoarseness, or laryngospasm (p > 0.05). However, a significant difference in cough existed between the three groups (p = 0.02). No significant differences were detected between the three groups regarding hemodynamic variables.
Conclusion: 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. ETT tolerance was more in the lidocaine group than the other two groups.

Keywords: Dexamethasone, Post-Extubation Symptom, Lidocaine, Normal Saline, Tracheal Tube Cuff

Introduction

Using cuffed endotracheal tubes (ETT) is a standard for gen eral anesthesia. However, tracheal tube cuff pressure would cause a range of complications intracheal mucosa. Th e problems include loss of mucosal cilia, ulceration, hemorr hage, tracheal stenosis and tracheoesophageal fistula.More o ften, patients complain of symptoms like sore throat, hoarse ness and dysphagia in the immediate post-extubation period. Coughing induced by an ETT can complicate emergence fro m general anesthesia, thus resulting in potentially dangerous hyperdynamic responses in the postoperative period. Such r esponses include hypertension, tachycardia, dysrhythmia, in creased intraocular pressure, increased intracranial pressure, wound dehiscence, and bronchospasm.

Intracuff pressure increases when nitrous oxide is used in g neral anesthesia and this pressure may cause postoperative sore throat. Nitrous oxide diffuses inside an air filled cuff faster than nitrogen can escape from it, this leads to increase in both volume and pressure inside an air filled cuff.

Filling an ETT cuff with a liquid instead of air can prevent rising pressure i nside the cuff.

Intravenous (IV) lidocaine is frequently used during anesthe sia just before intubation and in the presence of ETT to sup ress coughing or as an antiarrhythmic agent. On the other hand, dexamethasone is a potentcorticosteroid with analgesic, antiinflammatory, and antiemetic properties. Preoperative IV dexamethasone has been reported to reduce the incidence of postoperative pain and swelling following oral surgeries.

An effective method to reduce reactions to emergence from anesthesia may attenuate postoperative morbidity and impro ve patient outcome after surgery. Therefore, this study comp ared three methods of filling tracheal tube cuff with normal saline, lidocaine, and dexamethasone to evaluate their efficacy on post-extubation reactions.

AIMS

To compare the efficacy of intracuff lidocaine and dexamethasone in

- post extubation cough, sore throat and hoarseness incidence and severity
- adverse effects if any

Methods

The study was conducted between October 2017 – May 2018 on 240 ASA 1 and 2 adults for elective surgeries under general anesthesia after obtaining the ethical committee clearance and the informed written consent from the patient.

Inclusion criteria
- Patients undergoing elective surgeries under general anesthesia
- Adult males and females
- Asa 1 and 2
- Age 20 – 50 years

Exclusion criteria
- Body weight 20% more than the ideal body weight,
- Impaired kidney or liver functions,
- A history of bronchial asthma and chronic obstructive p ulmonary disease
- A history of smoking, respiratory tract infection during the past 6 weeks,
- Hypertension
- Operation time of less than 1 or more than 2 hours,
- Hypersensitivity to local anesthetics

The patients were divided into the following three groups based on simple random sampling. Randomisation will be by computer generated random numbers and concealed by sealed envelope technique.
Cuff pressure was kept at 20 cm H2O.
Group 1: the endotracheal cuff in this group of patients was inflated with normal saline.
Group 2: the endotracheal cuff in this group of patients was inflated with dexamethasone.
Group 3: the endotracheal cuff in this group of patients was inflated with 2% lidocaine.

Method
All the patients underwent a thorough pre-operative assessment on the previous day of surgery. On the day of the surgery, ringer lactate was infused 15ml/kg within 30 minutes. Baseline levels of blood pressure, pulse rate, respiratory rate and oxygen saturation were recorded. Patients were placed in supine position and cuffs in the first to third groups were filled with normal salin e, dexamethasone, and 2% lidocaine, respectively.
The patients were intubated with cuffed sterile polyvinyl chloride ETT with a standard high volume-low pressure cuff. General anesthesia was induced with 2 mcg/kg IV fentanyl and 2mg/kg IV propofol.
Tracheal intubation was performed 3 minutes after anesthesia while neuromuscular blockade with 0.5 mg/kg IV atracurium was used to facilitat e the procedure. Anesthesiawas maintained with intermittent 0.15 mg/kg IV atracurium, isoflurane with MAC of 1.2, O2 at 50% and N20 at 50%.
The patients were extubated after the full reversal of neuromuscular blockade, spontaneous ventilation, ability to follow verbal commands, eye opening or handgripafter suctioning at the discretion of the anesthetist in charge of the patient. The patients were assessed during emergence and 24 hours after surgery for hemodynamic indices including heart rate and blood pressure and incidence of post extubation sore throat, cough, laryngospasm and hoarseness.
Power of the study was kept at 80%, levels significance 5% at two tailed test.

Scoring

Table 1

Score	Sorethroat	Hoarseness	Laryngospasm
0	None	None	None
1	Mild	Noted by patient	Mild
2	Moderate	Obvious to the observer	Moderate
3	Severe	Aphonia	Severe

Statistical Tests
Statistical analyses were performed on a computer using SPSS18 software. Quantitative variables were compared using one way analysis of variance (ANOVA) and post hoc test whenever appropriate. The Kruskal-Wallis test was used for qualitative (ranking) variables. Microsoft word and excel have been used to generate graphs and table.
Data was presented as mean ± SD or number (%) and p values < 0.05 were considered as statistically significant.

Results
There were no significant differences between the three groups regarding post-extubation sore throat, hoarseness, or laryngospasm ($p > 0.05$).
However, a significant difference in cough existed between the three groups ($p = 0.02$).
No significant differences were detected between the three groups regarding hemodynamic indices.

Patient Demographics

Table 2

	Dexamethasone	Lignocaine	Normal saline	P value
Age	40.96	37.35	40.77	0.142
Weight	78.69	80.90	79.27	0.087

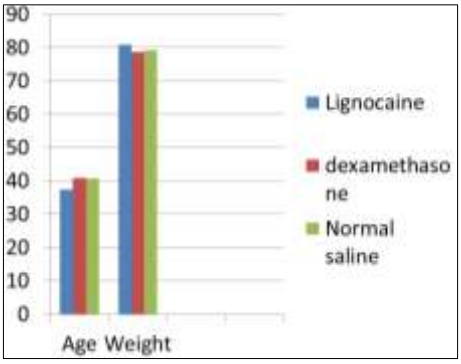

Fig 1

Immediate Post-Operative Vitals

Table 3

	Lidocaine	Dexamethasone	Normal saline	P value
Sbp	134±10	140±14	146±57	0.073
Dbp	70±7	75±5	84±10	0.061
Hr	81±11	92±17	93±9	0.086

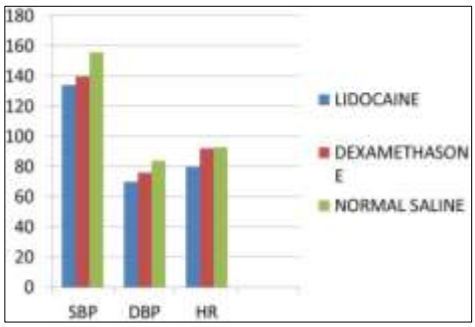

Fig 2

Adverse Effects

Table 4

	Lidocaine	Dexamethasone	Normal saline	P value
Cough	0.15 ±0.323	0.33±0.457	0.38±0.479	0.024
Sore throat	0.12±0.269	0.23±0.398	0.26±0.426	0.085
Hoarseness	0.05±0.139	0.11±0.269	0.14±0.312	0.191
Laryngospasm	0.05±0.139	0.05±0.139	0.05±0.134	0.998

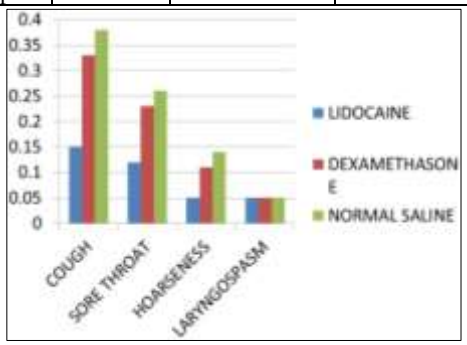

Fig 3

Discussion

Common measures to prevent post-extubation reactions include using ETTs with low intracuff pressure, and smaller-sized or steroid coated ETTs, applyingtopical lidocaine, and inhalation of steroids.

In this study, dexamethasone, 2% lidocaine and normal saline were injected into tracheal tube cuff

Rafi *et al*. [1]. Showed that lidocaine prevented the incidence of cough whereas dexamethasone seemed to better prevent cough severity.

Singh *et al*. [2]. Reported that use of saline or 2% lidocaine as aliquid me dia for filling the ETT cuff reduced postoperative sore throat and thereby tracheal morbidity.

Park *et al*. [3]. Showed that prophylactic use of 0.2 mg/kg of dexametha sone significantly decreased the incidence and severity of so re throat and hoarseness 1 and 24 hours after tracheal extubation of a double-lumen endobronchial tube

The potential mechanism of intracuff dexamethasone is presumably based on its anti-inflammatory activity, which includes inhibition of leukocyte migration, maintenance of cell membrane integrity, attenuation of lysosome release, and reduction of fibroblast proliferation.

In this study

Dexamethasone had more preventive effect on cough severity since it has been used as a mast cell stabilizer.

Lidocaine had more preventive effect on cough incidence due to the fact that it suppressed both the mechanical and chemical-induced airway reflexes, including the cough reflex after causing numbness of the tracheal mucosa.

Scope of the Study

Using dexamethasone for filling the ETT cuff to reduce post-extubation reactions was as effective as lidocaine, but more effective than normal saline.

Therefore, the drugs are recommended to be considered to improve patient's tolerance to anesthesia and intensive care.

Conclusion

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.

ETT tolerance was more in the lidocaine group than the other two groups.

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