

**ADDIS ABABA UNIVERSITY COLLEGE OF
HEALTH SCIENCE SCHOOL OF MEDICINE
DEPARTEMENT OF ANESTHESIA**



**A COMPARATIVE STUDY ON EFFECT OF TRACHEAL TUBE CUFFS FILLED
WITH AIR VERSUS ALKALINIZED LIDOCAINE ON HEMODYNAMIC REASPONSE
CHANGES DURING EXTUBATION AND POSTOPERATIVE LARYNGOTRACHIAL
MORBIDITIES IN CHILDRENS**

RESEARCH

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DEPARTMENT OF ANESTHESIA AS PARTIAL FULFILLMENT OF
REQUIREMENTS FOR MSC IN ANESTHESIA.**

JUNE 2020

Declaration

I, the undersigned declare that this thesis is my original work in partial fulfillment of the requirements for the master of science degree in anesthesia .I understand that plagiarism will not be tolerated and all directly quoted material has been appropriately referenced

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This thesis work has been submitted for examination with my/our approval as Advisors and tuore on the Master of Science degree in anesthesia.

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signature

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Table of content

| Contents | Page |
|---|-------------|
| Table of content | i |
| List of Abbreviation..... | iii |
| List of Tables and Figures..... | iv |
| List of Figures..... | iv |
| Acknowledgment..... | v |
| Abstract..... | vi |
| Chapter One: Introduction | 1 |
| 1.1. Background Information | 1 |
| 1.2. Statement of the Problem..... | 3 |
| 1.3. Justification of the Study..... | 5 |
| Chapter Two: Literature Review..... | 6 |
| 2.1. Patient Flow Chart | 9 |
| Chapter Three: Objective..... | 10 |
| 3.1 General objective | 10 |
| 3.2 Specific Objective..... | 10 |
| Chapter Four: Method and Material..... | 11 |
| 4.1 Study Area | 11 |
| 4.2 Study Design and Period..... | 11 |
| 4.3 Population..... | 11 |
| 4.3.1 Source Population | 11 |
| 4.3.2 Study Population..... | 11 |
| 4.4 Study Variables..... | 11 |
| 4.4.1 Independent Variable | 11 |
| 4.4.2 Dependent Variable..... | 12 |
| 4.5 Inclusion and Exclusive Criteria | 12 |
| 4.5.1 Inclusion Criteria..... | 12 |
| 4.5.2 Exclusive Criteria..... | 12 |
| 4.6 Sample Size and Sampling Technique | 12 |
| 4.7 Data Collection Technique and Instrument..... | 14 |
| 4.8 Operational Definition | 15 |
| 4.9 Data Quality Control..... | 15 |

| | |
|--|----|
| 4.10 Data Analysis and Interpretation | 16 |
| 4.11 Dissemination Plan | 16 |
| 4.12 Ethical Consideration | 16 |
| Chapter Five: Results | 17 |
| 5.1 Socio-demographic Status | 17 |
| 5.2 Results of Heamodynamic Changes | 18 |
| 5.2.1 Mean Heart Rate between the Groups | 18 |
| 5.2.2 Mean Systolic Blood Pressure between the Groups | 19 |
| 5.2.3 Mean Diastolic Blood Pressure between the Groups | 20 |
| 5.3 Results of Post-Operative Laryngo Tracheal Morbidities | 21 |
| Chapter Six: Discussion | 24 |
| 5.1 Limitations | 27 |
| 5.2 Strength | 27 |
| Chapter Seven: Conclusion and Recommendation | 28 |
| 5.1 Recommendation | 28 |
| References | 29 |
| ANNEX | 32 |
| Questioners | 33 |

List of Abbreviation

| | |
|------------------|---|
| AAU | Addis Ababa University |
| ASA | American Society of Anesthesiologist |
| Bpm | beat per minute |
| CP | Cuff Pressure |
| DSB | Diastolic Blood Pressure |
| ECG | Electro cardio graph |
| ETGA | Endo tracheal tube intubation in general anesthesia |
| ETT | Endo tracheal tube |
| GA | General Anesthesia |
| HR | Heart Rate |
| ID | Internal diameter |
| N ₂ O | Nitrous Oxide |
| PACU | Post Anesthesia Care Unit |
| POST | Postoperative Sore Throat |
| RCT | Randomized control trial |
| RR | Relative Risk |
| SBP | Systolic Blood Pressure |
| TASH | Tikur Anbessa Specialized Hospital |

List of Tables and Figures

| | |
|---|----|
| Table 1 Shows Demographic and clinical characteristics of the study participants who underwent elective surgery under general anesthesia with endotrachea tube entubation at TASH from October to January 2020..... | 17 |
| Table 2 Mean heart rate within air and lidocaine group in study participants underwent elective surgery with under GA with endotracheal tubes at TASH, from October to January to 2020. | 19 |
| Table 3 Mean SBP within air and lidocaine group in study participants who underwent elective surgery with under GA with endotracheal intubation at TASH, from October to January to 2020..... | 20 |
| Table 4 Mean DBP within air and lidocaine group in study participants who underwent elective surgery with under GA with endotracheal tube TASH, from October to January to 2020..... | 21 |
| Table 5 Postoperative cough within air and alkalized lidocaine group in study participants who underwent elective surgery with under GA with endotracheal tube at TASH, from October to January to 2020..... | 22 |

List of Figures

| | |
|---|----|
| Figure 1 Allocation of study group..... | 9 |
| Figure 2 Two-population proportion formula..... | 13 |
| Figure 3 Proportion of postoperative hoarseness and sore throat within air and alkalized lidocaine group in study participants undergoes elective surgery under GA with endotracheal tube at TASH, from October to January to 2020..... | 23 |

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Abstract

INTRODUCTION: When the lateral pressure exerted by an inflated cuff on tracheal mucosa exceeds capillary perfusion pressure, it can result in tracheal morbidity, loss of mucosal cilia, ulceration, hemorrhage, and tracheal stenosis. Patients may complain of cough, sore throat and hoarseness in the postoperative period. Lidocaine within tracheal tube cuffs seems to exert a localized effect on the trachea after diffusing through the cuff, resulting in improved tolerance to tracheal. Both alkalized and non-alkalized lidocaine used to fill tracheal tube cuffs reduces the incidence of postoperative sore throat.

OBJECTIVE: was to assess the effectiveness of tracheal tube cuffs filled with air verses alkalized lidocaine on hemodynamic response changes and laryngotracheal tracheal morbidities during and post extubation in children's.

METHODOLOGY: Institutional based observational prospective cohort study design used to address the study objective. All elective children aged 3-13 years who undergoing operation under general anesthesia with endotracheal intubation greater than one hour at TASH were selected. The outcome variable were Hemodynamic response changes i.e. (HR,SBP and DBP), was measured in the 5 min before, and 5 min following, tracheal extubation and laryngotracheal morbidities like cough, hoarsens and sore throat, evaluated as dichotomous variables (yes or no).

RESULTS: Hemodynamic changes that recorded during the study were the highest systolic and diastolic blood pressure and the heart rate. The results shows the heart rate difference of p value <0.001. Meanwhile the systolic blood pressures 8 hour after extubation between the groups were with p value of 0.003. The incidence of sore throat post operatively measured at 8hr has a significantly lowered in alkalized lidocaine groups compared to air with p value difference of 0.027. Meanwhile the incidence of postoperative sore throat that is measured at 24 hour shows significant difference among the groups with p value of 0.009.

CONCLUSION: Alkalized lidocaine inflated tracheal tubes have shows improved hemodynamic and laryngotracheal morbidities in children's.

Chapter One: Introduction

1.1. Background Information

Endotracheal intubation provides the most protected and controlled airway during general anesthesia or/and where ever in Intensive care unit/emergency room when airway protection is needed. The patient intubated orally or nasally, and ventilation can be spontaneous or assisted. Endotracheal tube (ETT) has cuff, which is inflatable to seal to the trachea, and it is called cuffed tube, uncuffed tube is an ETT tube, which has not a cuff. Uncuffed tracheal tubes were once preferred over cuffed tubes because of concerns about tracheal mucosal damage from excess cuff pressure. However, recent evidence does not support this, and the incidence of post- extubation airway morbidity is not increased when cuffed tubes are used (1).

A cuffed tube allows to measure tidal volume and proper pulmonary function tests. It also helps to measure accurate end tidal carbon dioxide and inhalational anesthetic agents. In addition to this proposes it also serves to decrease the consumption of medical gases, inhalational anesthetics prevents aspiration, reduce contamination of operation room environment and maintains the tube mid line in the trachea (2-5).

Many anesthesiologists, anesthesia professionals, doctors and nurses that works in the operation room and ICU checks the cuff pressure by a simple palpation of the pilot balloon of the endotracheal tube which is an indirect estimation of pressure in the cuffs. This method of confirmation is not correct and accurate measurement of the pressure in the cuff (6-10).

When the cuff pressure exceeds the tracheal mucosa capillary perfusion pressure, it can result in tracheal morbidity, loss of mucosal cilia, ulceration, hemorrhage, and tracheal stenosis. Patients may complain of sore throat, hoarseness, and dysphagia in the postoperative period (11-13).

The normal capillary pressure of the tracheal mucosa is between 25 – 30mmHg in adult individuals. In children's this pressure slightly as low as 20mmHg these is due to as age decreases the capillary pressure also decreases. So an increase in cuff pressure greater than 20 mmhg can result a significant damage to the tracheal mucosa in children's (14-17).

The product of the lateral wall pressure influences damage and the duration of intubation, of which the pressure has by far the greater importance. Superficial damage to the mucosa occurs

within 15 minutes at a lateral wall pressure of 20 mm Hg but is not progressive. At a pressure of 50 mm Hg damage may similarly be detected within 15 minutes and is more extensive with partial denuding of the basement membrane (16).

The most important thing is that the tracheal tube cuffs are a reservoir for the lidocaine to diffuse to the adjacent tracheal mucosa and gives comfort and improved tolerance to the tracheal and tracheostomy tubes. In addition to this effect intra cuff lidocaine reduces hemodynamic response changes during tracheal extubation in adults. The plasma lidocaine concentration that is measured 30 min after tracheal intubation indicates there is diffusion of lidocaine from the tracheal tube cuffs were below the toxic level of lidocaine in the plasma is about 5ug/ml (18-21).

1.2. Statement of the Problem

Among many methods that are used to secure the airway, end tracheal tube is associated with 30-70% complications during the postoperative period. Coughing, sore throat, dysphonia, dysphagia, dyspnea and various hemodynamic changes are one of the major post op complications. Post operative sore throat contains 50% incidence which are complained by vast majority of the surgical patients (18, 22). The incidence of coughing at emergence from general anaesthesia reaches in some cases 96% (23) Sore throat, dysphagia and dysphonia are frequent and occur in 50% of patients (23, 24). They are generally badly experienced by the patients. Coughing at emergence from anaesthesia reflects intolerance to the endotracheal tube. It may cause many clinical side effects including tachycardia, hypertension, intracranial hypertension, increased intraocular pressure and surgical complications (23, 25).

Endotracheal intubation resulted 15% incidence of sore throat on post operative period when we compare it with the use of supraglottic devices which have the incidence of 9.8%. Childrens that are intubated with uncuffed tracheal tube have 37% of post operative sore throat than children intubated with tracheal tube cuffs which shows 19% of them complains sore throat (26-28).

The risk factors leading to post operative laryngotracheal morbidities include diabetes mellitus, hypotension, hypertension, malnutrition which could aggravate mucosal perfusion predispose to mechanical damage to throat. The other potential risks are size of endotracheal tube, type of tube design, the value of cuff pressure, use of nitrous oxide in gas mixture, intubation technique, experience of the professional, movement of tracheal tube during surgery, excessive pharyngeal suctioning, type of surgery, surgical technique, insertion of nasogastric tube, patient position, and duration of surgery (29).

Several methods have been tried as a measure to decrease the increase in cuff pressure and different cuff filling methods have been suggested, like 100% oxygen, anesthetic gas mixture, saline, lidocaine, and use of alkalinized lidocaine (29-34).

Many methods have been used to overcome the side effects of tracheal intubation at postoperative period from general anaesthesia. This included extubation under deep anaesthesia and opioids administration. This method was associated with a reduction of cough occurrence at extubation but exposed to delayed recovery from anaesthesia and risk of gastric aspiration (35-37).

During general anesthesia, lidocaine has been used with the intention of suppressing the cough reflex as an auxiliary in anesthesia, in order to prevent hemodynamic disturbances during intubation and in the recuperation phase of anesthesia; and in an attempt to prevent postoperative sore throats. To effectively suppress coughing requires a high lidocaine serum concentration of around 3 µg/ml, which can be achieved through intravenous injection of 1 to 2 mg/kg of the drug. However, lidocaine administered intravenously can produce sedation and prolong the process of awakening from anesthesia (37-39).

When we see some of the controversies, some authors says effect of lidocaine in preventing tracheal intubation associated side effects when instilled onto the glottis before intubation but not when it is used to inflate the endotracheal tube cuff (40). In addition, others say filling of ETT cuff with lidocaine is not superior to IV lidocaine in short pediatrics or adult procedures these is one of the reasons, which call for the study (41).

1.3. Justification of the Study

Hemodynamic changes and laryngotracheal morbidity are the main problems encountered in this age group especially in our set up. Elevation in blood pressure and heart rate due to endotracheal extubation are transient but may have significant effects. Smooth extubation requires attenuation of presser response and maintenance of baseline hemodynamic stability. Additionally, laryngotracheal morbidities need to be treated as a postoperative pain for the better outcome of surgery. Undertaking such studies in resource limited area can improve pain treatment and patient comfort by providing smooth postoperative outcome to the patient, family and for postoperative staffs. The technique, besides minimizing the cardiovascular responses and postoperative tracheal morbidities to tracheal extubation may satisfy: Attenuate presser response to extubation with minimal effect on respiratory, cerebral and hemodynamic depression, Applicable universally and easily and Available in the setup (Alkalinized lidocaine widely).

The trend in our country is using opioids and different analgesics agents to obtund hemodynamic effects associated with extubation. Lack of many drugs like intravenous lidocaine, opioids, lidocaine sprays, and lidocaine jell and lack of monitoring device for cuff pressures are unavailable or accessed in limited amount in our set up that exacerbates these complications

Therefore, assessing the hemodynamic responses and laryngotracheal morbidities with alternative techniques will enable anesthetists to select better cuff inflating agent with minimum risk and better outcome. The aim of the study is producing or testing a very cheap method of preventing this complication by inflating the tracheal tube cuffs with alkalinized lidocaine

As far as our knowledge goes, no published data exist on comparison and evaluation of the effects of intra cuff lidocaine and air on attenuation of hemodynamic responses and laryngotracheal morbidities to tracheal extubation in my study area. It can be used as a source of information for further research.

Chapter Two: Literature Review

A study done on 334 children's on postoperative sore throat at a tertiary pediatric hospital in the United Kingdom one hundred and ninety-seven patients were included in the final analysis. The frequency of postoperative sore throat was 36.5%. Stridor occurred in 1.5%, laryngospasm 1.0%, postoperative nausea 59.4%, vomiting in recovery 4.6% and delayed oral intake due to postoperative sore throat 30%. Nausea, vomiting, thirst and pain were associated with a sore throat. Univariate analysis showed anaesthesia for longer duration of hours and use of an endotracheal tube was statistically associated with higher risk of sore throat. Over 50% of children with an endotracheal tube cuff pressure < 20 cmH₂O had a postoperative sore throat (42).

During cuffed intubation, damage to the trachea is least likely when the lateral wall pressure exerted by the cuff does not exceed the mean capillary perfusion pressure of the mucosa. Endotracheal cuffs often over inflated in clinical practice. Since cuff-induced tracheal damage is most influenced by the lateral wall pressure, these results suggest that the use of Lanz-type tubes should be mandatory in intensive care units or when a cuffed tracheostomy tube is required and they should be considered for use in more routine anaesthetic practice (43).

In study done on the Effect of intracuff alkalinized 2% lidocaine on endotracheal tube cuff pressure and postoperative throat symptoms in anaesthesia maintained by nitrous oxide by Rizvanovic et.al which studied on 90 patients classifying into three groups air ,lidocaine and saline. Shows the incidence of sore throat dropped by half in the group Saline (23.3%) and in the Lidocaine (13.3%) 6 hours after extubation, while it remained unchanged (60%) in the air group. Twenty-four hours after extubation, sore throat persisted only in the group Air. The peak of hoarseness incidence was recorded 2 hours after extubation: 18 (60%) patients in the group Air, 14 (46.3%) in the group Saline and 7 (23.3%) in the group Lidocaine (44).

A study done on different ETT types on their cuffs which says Endotracheal cuff pressure and tracheal mucosal blood flow: endoscopic study of effects of four large volume cuffs while large volume cuffs shows a continuous lateral wall pressure above 30 cm water (22 mm Hg) compromises mucosal capillary blood flow. This flow is totally obstructed by the time lateral wall pressure reaches 50 cm H₂O (37 mm Hg). This is the most important cause of mucosal

damage and is avoidable by careful attention to inflation technique and continuous monitoring of intra cuff pressure (43).

Using an in vitro experimental model, eight currently available, pediatric-cuffed tracheal tubes, with internal diameters (ID) of 5.0 mm from five different equipment manufacturers were investigated in University Children's Hospital Zurich, Switzerland. Shows, that following complete deflation of the cuffs and equilibration of cuff pressure to atmospheric pressure, the pilot balloons of the tracheal tube cuffs were connected to a cuff pressure manometer (Mallinckrodt, Athlone, Ireland) using a three way stopcock. Pediatric tracheal tube cuffs restricted within a tracheal model have a considerably reduced compliance and the cuff pressure produced similar measured tracheal wall pressure, independent of whether a higher or lower volume compliant cuff is used. Therefore, cuff pressure monitoring and pressure limitation is strongly recommended for cuff inflation to guarantee a cuff pressure within a safe limit and to avoid related airway morbidity (45).

One study that are done in Africa (Egypt) on whether the endotracheal tube cuff inflation media in by alkalized lidocaine or saline effect on incidence and severity of postoperative throat in children's. Shows that there is significant reduction in the incidence and severity ($p=0.005$ & $p=0.014$) of cough at extubation and in the PACU ($P=0.048$ & $P=0.014$). The incidence and severity of postoperative sore throat was also reduced in the lidocaine group compared to the saline group ($p=0.025$ and 0.031 respectively) (46).

A Hospital based quantitative cross sectional study which was conducted at Gondar university on the risk factors that causes postoperative throat pain after general anesthesia due to ETT intubation concluded that study the prevalence of postoperative sore throat was high (59.6%). Female sex, multiple intubation attempts and the use of nasogastric tube were the independent risk factors for postoperative sore throat in Gondar university hospital (47) .

A study done in Sao paulo brazil on effectiveness and safety of endotracheal tube cuffs filled with air and alkalized lidocaine Among 50 patients 120 minutes after starting and upon ending nitrous oxide anesthesia. And patients allocated to two groups: Air, with ET cuff inflated with air to attain a cuff pressure of 20 cmH₂O; and Lido, with ET cuff filled with 2% lidocaine plus 8.4% sodium bicarbonate to attain the same pressure. ET discomfort before tracheal extubation, and

sore throat, hoarseness and coughing incidence were studied at the time of discharge from the post-anesthesia care unit, and sore throat and hoarseness were studied 24 hours after anesthesia. Shows the incidence of agitation at the time of tracheal extubation was considerably less in the Lido group ($p = 0.022$) than in the Air group. In spite of greater incidence of sore throats and hoarseness in the Air group at the time of release from the PACU, there was no notable difference between the groups ($p > 0.05$). The incidence of sore throats was significantly lower in the Lido group than in the Air group, 24 hours after extubation, while the incidence of hoarseness in the postoperative evaluation did not reveal any notable differences between the two groups ($p = 0.07$), despite the fact that there was higher occurrence in the Air group. The intensity of the complaints of sore throat and hoarseness revealed little difference between the groups ($p > 0.05$), while the incidence of coughing during the patients' stay in the PACU was low and very similar in the two groups ($p > 0.05$) (48).

On the study which is performed on the effect of lidocaine on reducing the tracheal mucosa damage following trachea intubation on 51 patients by grouping patients into air and alkalized lidocaine shows After 24 h, erythema and/or edema of tracheal mucosa were seen in 2 patients (7.7%) of lidocaine group and 6 patients (24%) of air group ($P = 0.109$) (49).

The trial that are done on 80 participants by grouping the patients into 4% lidocaine and air as endotracheal tube inflation media to asses post intubation morbidity showed a significant difference in the incidence of post-operative sore throat in group I (air) and group II (lidocaine). Lidocaine group had lesser sore throat incidence i.e. hoarseness and sore throat in the air group air 45% and 60% respectively where as in lidocaine group is 15% and 20% respectively. In addition, there was no significant change in heart rate at one and two minutes after extubation. However, there was a highly significant change in both the study groups at 5, 10, 30 and 60 min after extubation. Similarly, changes observed a highly significantly decreased blood pressure in lidocaine than in air groups at 2, 5, 10, 30 and 60 min after extubation (50).

1.4. Patient Flow Chart

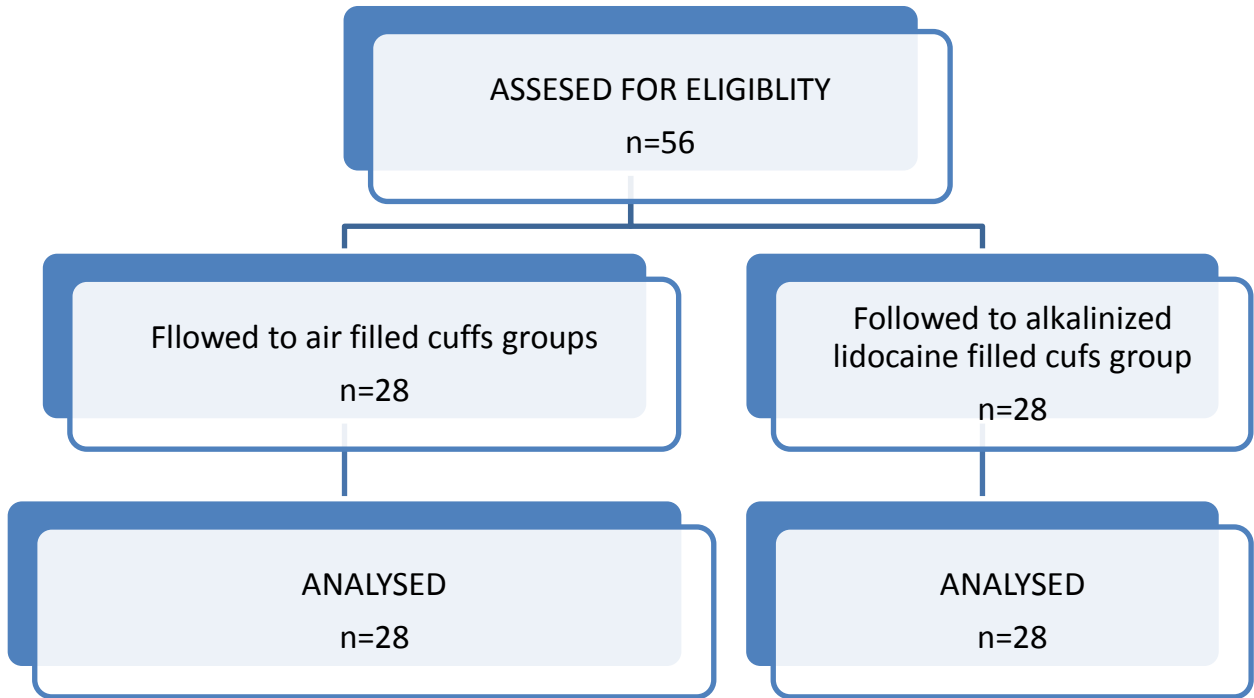


Figure 1 allocation of study group

Chapter Three: Objective

3.1 General objective

The main objective of study was to assess the effectiveness of tracheal tube cuffs filled with air verses alkalinized lidocaine on the hemodynamic responses changes during extubation and postoperative laryngotracheal morbidities in children's from October 30 to February 30 2020.

3.2 Specific Objective

- To compare postoperative hemodynamic changes associated with tracheal extubation when tracheal tube cuffs filled with air verses alkalinized lidocaine.
- To compare the incidence of cough, sore throat and hoarseness immediately after extubation and post operative period when endotrachial tube cuff filled with air verses alkalinized lidocaine.

Chapter Four: Method and Material

4.1 Study Area

This study was conducted in Tikur Anbessa referral teaching university hospitals, which are the biggest referral hospital, located Addis Ababa in Ethiopia. Tikur Anbessa specialized hospital is multi-specialist tertiary care teaching hospital in Ethiopia, opened since 1972 and, in 1998 transferred to school by FMOH since then it became a university teaching hospital. TASH is now the main teaching hospital for clinical and preclinical trainings of most disciplines. It is also an institution where specialized clinical services that are not available in other public or private institutions rendered to the whole nation. It has one Blood bank, about 700 beds, it has about 13-operation theatre and more than 900 health professionals in the different specialties dedicated to providing health care services and the various departments' residents under specialty training in the school of medicine and provide patient care in the hospital. As documents in the hospital shows, anesthesia and surgery logbook on average 150 elective children's underwent surgery under general anesthesia within three-month period.

4.2 Study Design and Period

A prospective institutional based observational cohort study was employed from October - February 2020.

4.3 Population

4.3.1 Source Population

All children operated under general anesthesia at Tikur Anbessa Specialized Referral hospital.

4.3.2 Study Population

All elective children aged 3-13 years who undergo operation under general anesthesia with endotracheal intubation for greater than one-hour in Tikur Anbessa Specialized university teaching and referral hospital were conducted from October to February to 2020.

4.4 Study Variables

4.4.1 Independent Variable

Socio demographic variables like

- ✓ Age and sex,
- ✓ Duration of surgery, duration of anesthesia

- ✓ ASA status,
- ✓ diagnosis,
- ✓ nature of surgery
- ✓ induction and maintenance agents
- ✓ Intubation attempt and use of nitrous oxide or opioids.
- ✓ Any adverse effect to the tracheal tube (accidental extubation, cuff rupture, misplacement etc).

4.4.2 Dependent Variable

Outcome variables for the study were.

- ✓ HR,SBP AND DBP
- ✓ CUOGH, SORE THROAT AND HOARSNESS

4.5 Inclusion and Exclusive Criteria

4.5.1 Inclusion Criteria

All Children aged 3– 13 years, of ASA physical status 1 or 2 undergoing elective surgery under general anesthesia requiring oral tracheal intubation were considered eligible for inclusion in the study.

4.5.2 Exclusive Criteria

Exclusion criteria's were

- ✓ those with oropharyngeal or neck malformations
- ✓ patients who had previously required tracheal intubation or a tracheostomy
- ✓ the presence of stridor or dysphonia
- ✓ those requiring surgery to the neck, larynx or oropharynx
- ✓ those requiring a nasogastric or orogastric tube
- ✓ Patients currently taking steroid medication or local anaesthetic agents administered via a route other than that used to fill the tracheal tube cuffs.

4.6 Sample Size and Sampling Technique

Sample size is calculated with the incidence of sore throat that are observed in the PACU after tracheal intubation in using the study done by Navarro et al (18).taking these, the sample size was calculated based on two proportion population principle. For a type, one error of 0.05 and

type two error of 0.2 with a power equal to 80% and confidence interval of 95%.thus the sample size was 56 patients with 28 patients in each group.

$$\frac{P_1(1-p_1) + p_2(1-p_2)}{(P1-p2)^2} \dots\dots\dots (fig.2)$$

$$\frac{0.02(1-0.02) + 0.2(1-0.2)*2.71}{(0.2-0.02)^2} = 24.98$$

n = Sample size in each group

α =significance level (1.96)

1-β=power of study at 80% (0.84)

q1= 1-p1

q2=1-p2

p1= incidence of postoperative in lidocaine group

p2= incidence of postoperative hoarseness in air group

It were approximated to 28 for each group, When 10 % of contingency is included for dropouts, total sample of 56 patients or 28 patients per group was required.

By taking p1 and p2= incidence of post operative sore throat at the PACU, when it is calculated 24.98 when 10 % of contingency is included for dropouts, total sample of 56 patients or 28 patients per group was eligible for the sample in each groups.

FIGURE 2 Two-population proportion formula

Systematic random sampling method used for data collection. The sampling interval was two and the first study participant (random start) was selected using lottery method from the daily operation schedule list.

4.7 Data Collection Technique and Instrument

After we received written informed consent from ethical committee of our department, a total of 56 patients that All aged 3– 13 years, of ASA physical status 1 or 2 undergoing elective surgery under general anaesthesia requiring oral tracheal intubation that full fill the inclusion criteria were considered eligible for the study.

Patients were allocated into one of two groups after whether air or alkalized lidocaine will used to inflate the cuff of the endotracheal tube: the control group, in which air were used as control Group 1 and in which alkalized lidocaine were assigned into group 2 was used.

All patients were visited the evening before surgery; informed consent was obtained, and any drug did not premedicate them. On arrival in the operating suite, all patients were attached to ECG, pulse oximetry, temperatures and non-invasive blood pressure monitoring.

At the induction of anesthesia, a patient breathes 100% oxygen via a facemask and then, all patients were anesthetized according to a standard protocol. All patients received thiopentone for induction and suxamethonium as a muscle relaxant according to their weight. The analgesic agent used in all patient groups is tramadol and pethidine according to their weight before induction of general anesthesia. Isoflurane were the maintenance agents that are used in the two groups, Vecronium was the muscle relaxants that are used for anaesthetic maintenance in all patients, and the reversal agent was neostigmine.

Laryngoscopy were performed and the trachea were intubated with a standard cuffed endotracheal tube according to the patient's age. Laryngoscopic attempt were recorded and all patients were intubated at the first attempt. Tubes were selected according to the age of the patient. The endotracheal tube cuff were inflated, in accordance with the randomization, until there was no air leak around the tube when positive pressure applied. Alkalized lidocaine used to inflate the tubes was prepared by mixing of 19 ml of lidocaine 1% and 1ml of sodium bicarbonate solution. The total amount of alkalized lidocaine used for inflation was 1ml to 2ml.

Hemodynamic changes measured were the differences between the highest systolic and diastolic blood pressures and heart rate measured in the 5 min before, and 5 min following, tracheal extubation. Laryngotracheal morbidities are cough, blinded Observers, recorded in the recovery room and 8 and 24 hour following tracheal extubation, evaluated hoarseness and sore throat. In

the recovery area, the parent or legal guardian were encouraged to join the patient and help the observers to identify signs of laryngotracheal morbidity, especially in younger patients. If required, sore throat were identified according to the faces pain scale (VAS) score. Any adverse event related to the tracheal tube (cuff rupture, misplacement, accidental extubation, etc.) were documented. Our primary outcomes were haemodynamic changes due to orotracheal tube removal and laryngotracheal morbidity.

4.8 Operational Definition

- **Sore throat**-a constant pain or discomfort in the throat independent of swallowing
- **Hoarseness**-difficulty in speaking or pain on speaking
- **Cough**-a sudden reflex that forces air out of throat
- **Alkalinized lidocaine**- alkalinized lidocaine is a solution that prepared by mixing 19 ml lidocaine 1% or 2% with 1 ml sodium bicarbonate 8.4% solution.
- **ASA status**: is a surgical risk stratifications validated by American Society of Anesthesiologist; described as follows:
 - **ASA I**: a healthy patient with no organic/physiological/psychotic problems
 - **ASA II**: controlled medical conditions with mild systemic effect and no limitation of functional ability
 - **ASA III**: medical condition with severe systemic effect, limitation in functional capacity
 - **ASA IV**: poorly controlled medical conditions associated with significant impairment in functional ability that is potential threat to life
 - **ASA V**: critical condition, little chance of survival without surgical procedure
 - **ASA VI**: brain dead patient undergoing organ donation

4.9 Data Quality Control

To assure quality of data, training on the objectives and relevance of the study and brief orientations on the assessment tools and were provided for data collectors and supervisors. During data collection, regular supervision and follow up was undertaken. Supervisors were checked each questionnaire daily with further cross check by principal investigator for completeness and consistency of data.

4.10 Data Analysis and Interpretation

Data were entered into for entry and transported data was checked manually for completeness, then coded, and entered into SPSS V 20 for analysis. Normality of the distribution of data were tested by the Shapiro-wilk test and Histogram with superimposed curve. Comparison of numerical variables between study groups was done with independent t- test. Homogeneity of the variances were approximately assumed for each and every data that we ran independent t-test by Levene's test. Data expressed in terms of mean \pm standard deviation. Categorical data were assessed by Chi-square tests. P value <0.05 is considered statistically significant for all analysis. Descriptive statistics used to summarize data, tables and figures for display results.

4.11 Dissemination Plan

This thesis submitted to College of Health Sciences, Department of anesthesia and a copy of this material given to Tikur Anbessa, Hiwot Fana Specialized University Hospital, Addis Ababa University student research office, Ethiopian Association of Anesthetists and Ethiopian ministry of health.

After presentation on workshops and seminars," hopefully "it will be published in peer reviewed reputable journals. It also serves as a reference material to researchers, experts and policy makers for intervention.

4.12 Ethical Consideration

Prior to data collection, the proposal were reviewed by the ethical committee of college of health science school of medicine department of anesthesia. Then after official letter for permission was requested from department of anesthesia, which was given to Tikur Anbessa specialized Hospital clinical director office. Moreover, the objective of the study explained to both hospital administration and the patients who were included in the study. Written consent from the patients were asked and Confidentiality of the information was assured by using code numbers than personal identification names and keeping questionnaires locked.

Chapter Five: Results

5.1 Socio-demographic Status

A total of fifty six patients participated in these study 28 in air (room air) and 28 in lidocaine (alkalinized) filled endotracheal tube groups and all of the participants were included in the study. The distribution of ASA status in the sample groups has not any significant changes between the groups the p value obtained were 0.158. Age of participant in the study groups has with mean 6.57 ± 2.741 in air group and lidocaine exhibits with a mean of 7.57 ± 2.727 with p value of 0.177.

The demographic status and clinical characteristics of data were comparable between groups with p value greater than 0.05 (table 1).

Table 1 Shows Demographic and clinical characteristics of the study participants who underwent elective surgery under general anesthesia with endotrachea tube entubation at TASH from October to January 2020.

| | | AIR | LIDOCAINE | P-VALUE |
|---|------------------|---------------------|--------------------|---------|
| | | FREQUENCY | FREQUENCY | |
| GENDER | MELE | 13 (48.8%) | 16 (55.2%) | 0.422* |
| | FEMALE | 15 (55.6%) | 12 (44.4%) | |
| Nature of surgery | GENERAL SURGERY | 14 (40.00%) | 21 (60.00%) | 0.097* |
| | UROLOGIC SURGERY | 14 (66.7%) | 7 (33.3%) | |
| ASA status | ASA 1 | 21 (56.8%) | 16 (43.2%) | 0.158* |
| | ASA2 | 7 (36.8%) | 12 (63.2%) | |
| AGE | IN MEAN AND SD | 6.57 ± 2.741 | 7.57 ± 2.727 | 0.177** |
| Duration of surgery | IN MEAN AND SD | 111.46 ± 28.416 | 122.50 ± 19.93 | 0.098** |
| Duration of anesthesia | IN MEAN AND SD | 128.68 ± 28.687 | 139.64 ± 21.77 | 0.113** |
| P* results obtained from chi square test P** results obtained from independent t test SD=Standard Deviation | | | | |

5.2 Results of Hemodynamic Changes

A hemodynamic response changes recorded during the study were the HR, SBP and DBP measured 5 minute before and 5 minute after extubation. The following assumptions were fulfilled for our data to run (perform) independent and dependent sample t-test and present the result in this research paper. Assumptions, which our data fulfilled to be carried out on independent sample t-test:

- Our outcome variables was measured on a continues scale(HR, SBP and DBP)
- Our independent variable was contained two categorical (independent group), group air and group Lidocaine
- Independence of the observations were assumed
- There were no significant outliers in both groups for all data that we ran independent t-test
- Normality of the data were checked by Shapiro wilk W-test for each and every data that we ran independent t-test and approximately normality was assumed ($p > 0.05$)
- Homogeneity of the variances were approximately assumed for each and every data that we ran independent t-test by Levene's test of equality of variance ($p > 0.05$)

5.2.1 Mean Heart Rate between the Groups

The results of independent t-test shows that heart rate (bpm), 5 minute before extubation has significantly lower in lidocaine group with the mean of 109.93 ± 9.281 compared to the mean heart rate in air groups 114.68 ± 7.144 , with mean difference of $M=4.750$, 95% confidence interval CI (0.316,9.188) and p value is 0.036, which is significant.

Similarly, the results of heart rate (bpm) difference 5 minute after extubation also shows significant decrease in lidocaine group with mean 107.29 ± 6.457 compared to air group 122.04 ± 8.809 . The mean difference $M=14.750$, 95% confidence interval CI (10.612,18.888) and p between the groups were of <0.001 (table2).

Table 2 Mean heart rate within air and lidocaine group in study participants underwent elective surgery with under General Anesthesia with endotracheal tubes at TASH, from October to January to 2020.

| | AIR GROUP | LIDOCAINE GROUP | *P VALUE |
|--|------------------------------------|------------------------|------------------|
| HEART RATE (bpm) | MEAN AND STANDARD DIVIATION | | 0.036 |
| HR 5 MIN BEFERE | 114.68±7.144 | 109.93±9.281 | |
| HR 5 MIN AFTER | 122.04±8.809 | 107.29±6.457 | <0.001 |
| *P value is obtained from independent t- test | | | |

5.2.2 Mean Systolic Blood Pressure between the Groups

The results of independent sample t-test of these study shows that systolic blood pressure (mmhg) 5 minute before extubation has significantly lowered in lidocaine group with mean of 103.54±6.979 compared to air group shows mean of 108.75±9.308. The mean difference M=5.214, 95% confidence interval CI (0.806, 9.622) and p value difference between the groups were 0.021 which is significant difference.

Similarly, the results of systolic blood pressure (mmhg) 5 minute after extubation in this study shows a significant decrease in lidocaine group with mean of 99.64±8.434 compared to air group, which shows mean of 108.21±11.902. And mean difference M=8.571, 95% confidence interval CI (3.045, 14.098), the p value between the groups were of 0.003, which is significant.

Table 3 Mean SBP within air and lidocaine group in study participants undergoes elective surgery under General Anesthesia with endotracheal intubation at TASH, from October to January to 2020

| | AIR GROUP | LIDOCAINE GROUP | P- VALUE* |
|--|------------------------------------|------------------------|------------------|
| SYSTOLIC BLOOD PRESSURE(mmhg) | MEAN AND STANDARD DEVIATION | | |
| 5 MIN BEFORE | 108.75±9.308 | 103.54±6.979 | 0.021 |
| 5 MIN AFTER | 108.21±11.902 | 99.64±8.434 | 0.003 |
| *P value gained were conducted from independent sample t-test | | | |

5.2.3 Mean Diastolic Blood Pressure between the Groups

The results of independent t-test shows diastolic blood pressure (mmhg) 5 minute before extubation has a decreased result in lidocaine group with mean of 66.29 ± 11.055 compared to air group, with mean of 72.07 ± 10.165 . The mean difference $M=5.786$, 95% confidence interval CI (0.96,11.476) and p value between the two groups shows 0.04 which is significant.

Similarly, the diastolic blood pressure (mmhg) 5 minute after extubation shows significant decrease in lidocaine group with the mean value of 65.79 ± 9.195 compared to air group, with mean of 73.54 ± 9.508 . The mean difference $M=7.750$, 95% confidence interval CI (2.739,12.761) and p value between the groups shows value of 0.003, which is significant.

Table 4 Mean DBP within air and lidocaine group in study participants undergoes elective surgery under General Anesthesia with endotracheal tube at TASH, from October to January to 2020.

| | AIR GROUP | LIDOCAINE GROUP | * P- VALUE |
|---|------------------------------------|------------------------|-------------------|
| DIASTOLI BLOOD PRESURE AT | MEAN AND STANDARD DEVIATION | | |
| 5 MIN BEFORE | 72.07 ± 10.165 | 66.29 ± 11.055 | 0.04 |
| 5 MIN AFTER | 73.54 ± 9.508 | 65.79 ± 9.195 | 0.003 |
| *The p value obtained was from an independent t- test. | | | |

5.3 Results of Post-Operative Laryngo Tracheal Morbidities

The results of incidence of postoperative laryngotracheal morbidities recorded were at the PACU, 8-hour and 24 hour after extubation.

The results of chi square shows incidence postoperative coughs recorded in the PACU shows significant increments with the proportion of 70% occurrence in air group compared to 30% in the lidocaine group. The p value difference between the groups shows of 0.026, which is significant.

Meanwhile the result of chi square value for the incidences of cough at 8-hour post operatively shows 70% in air and 30% in lidocaine group. The p value difference between the groups shows value of 0.163, which is not significant.

Table 5 postoperative cough within air and alkalized lidocaine group in study participants undergoes elective surgery under General Anesthesia with endotracheal tube at TASH, from October to January to 2020.

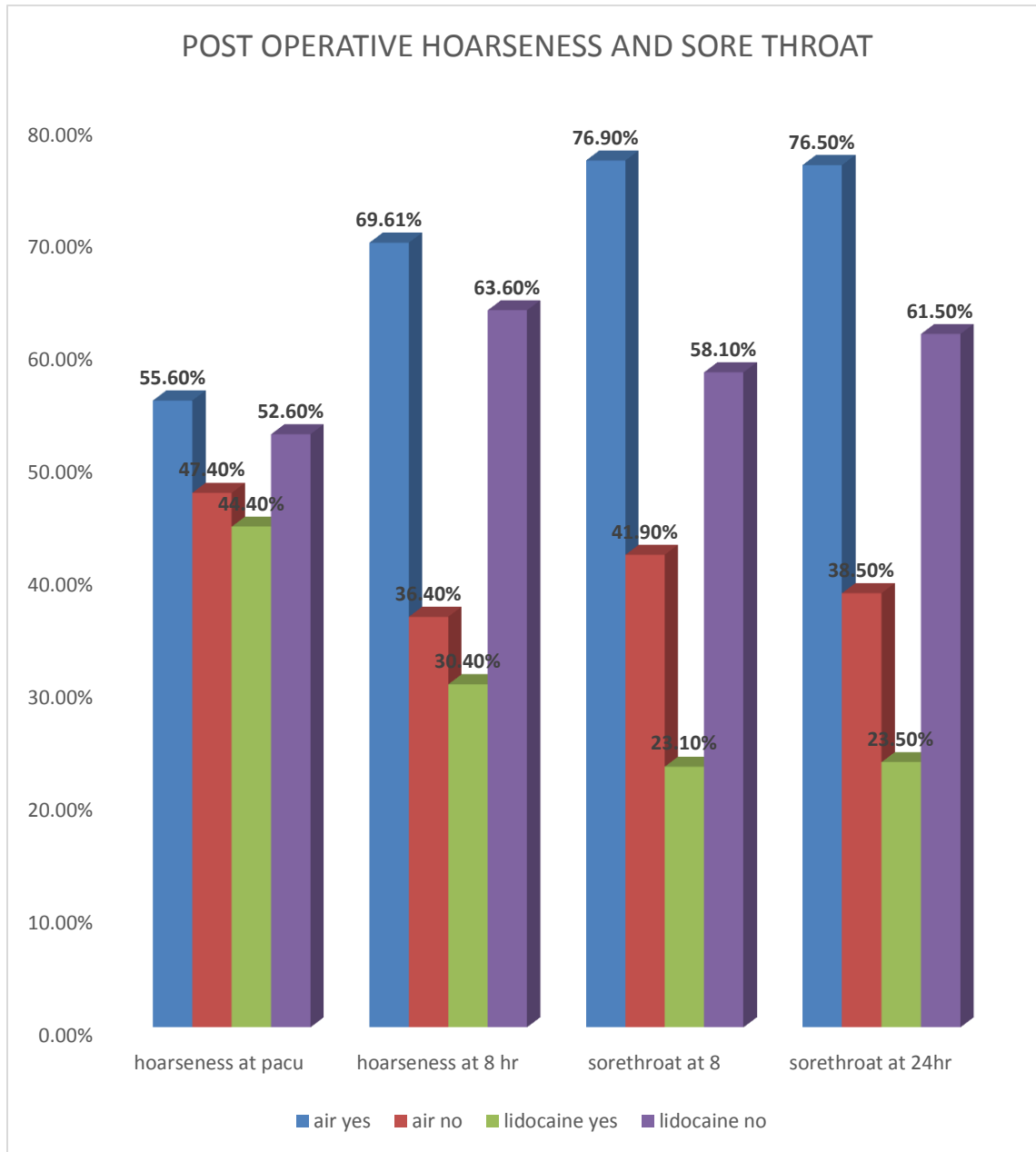
| CUOGH AT | Air | | lidocaine | | p-value |
|----------------|-------------------------|---------------------------|-------------------------|---------------------------|--------------|
| | yes | No | Yes | No | |
| FEATURE | | | | | |
| PACU | 14 70% | 14 38.9% | 6 30% | 22 61.1% | 0.026 |
| 8HR | 7 70% | 3 45.7% | 21 30% | 25 54.3% | 0.163 |

The result of chi square shows the incidences of operative Hoarseness at extubation, in the PACU, were lower in lidocaine with the proportion of 44.4% compared to 55.6% in air groups. The p value between the groups has not show significant difference, which is 0.567. Meanwhile the incidence of postoperative hoarseness at 8 hours shows significantly lowered in the groups with the proportion of 30.4% in lidocaine compared to 69.6 % in air group. The p value between the groups shows 0.014, which is significant.

In our study, the results of chi square shows the incidence of postoperative sore throat at 8 hour has a significantly decreased in alkalized lidocaine groups with the proportion of 23.1% compared to air group which shows 76.9 % . With p value, difference between the groups was 0.027, which is significant.

Similarly, the results of chi square shows the incidence of postoperative sore throat that were measured at the 24-hour shows has lowered in lidocaine with proportion of 23.5% in compared to 76.5% in air group. The p value difference between the groups was 0.009, which is significant (figure 3).

Figure 2 Proportion of postoperative hoarseness and sore throat within air and alkalized lidocaine group in study participants undergoes elective surgery under General Anesthesia with endotracheal tube at TASH, from October to January to 2020.



Chapter Six: Discussion

Administration of general anesthesia using cuffed endotracheal tubes is a common practice in our set up for management general anesthesia for major surgeries. Among many complications that occurs during extubation and post operatively period are cough, sore throat and post hoarseness, which are associated with endotracheal tube cuffs. These complications are due to direct trauma or damage to the structures of the tracheal mucosa and throat. post operative cough at the time of emergence from general anesthesia and recovery room can leads to serious complications like hypertension, cardiac arrhythmias, myocardial ischemia, surgical bleeding ,bronchospasm and raised intra cranial and ocular pressures (51).

Our results shows significantly lower heart rate (bpm) 5 minute before extubation in lidocaine group with the mean of 109.93 ± 9.28 compared to air group, which shows mean of 114.68 ± 7.144 . The p values between the groups were 0.036. This result is comparable with the heart rate difference seen in the study done Soares et al in children's shows p value of < 0.001 among the groups.(48).

Our finding shows the heart rate (bpm) after 5-minute post operatively significantly decreased in lidocaine group with mean of 107.29 ± 6.457 compared to air with mean of 122.04 ± 8.809 group. The p value difference between the groups was < 0.001 . This result is comparable to the study done by Soares et al also shows a reduction in the mean heart rate after extubation in 1% lidocaine was 115.1 ± 1.3 compared to 121.2 ± 16.3 in air group, with p value difference of 0.007 among the groups (48). Additionally in the study done by using lidocaine and air in adults population measuring heart rates at 1, 2, 5, 10, 30 minutes after extubation shows similar result to our study with the mean heart rate were lower in the lidocaine groups at 5 minute post operatively with p value of 0.003 (50). Meanwhile contrary to our result Benzadi et al measured the heart rate from one to 5-minute post operatively shows not significant difference among the groups with p value of 0.942. This is due to their study uses shorter duration of surgical procedures.

Our result shows systolic blood pressure (mmgh) before 5 minute before extubation has significantly lowered in lidocaine group with mean of 103.54 ± 6.979 compared to air group, which shows mean of 108.75 ± 9.308 . The p value between the group were 0.021. This result is comparable to, study done by Soares et al in children's shows significant decrease among groups with p value of < 0.021 (48). This effect is due to lidocaine inflated cuffs were tolerable than air filled endotracheal tubes.

Our study shows the systolic blood pressure (mmgh) 5 min after extubation in shows a significant decrease in lidocaine group with a mean of 99.64 ± 8.434 compared to air group, which shows mean of 108.21 ± 11.902 . The p value difference between the groups were 0.003. This result is comparable with the study done in children's by Soares et al which shows a significant decrease in the mean of SBP in lidocaine group (110.9 ± 15.7) than air group (108.7 ± 17.1) with p value of 0.022 between the groups (48). This is due to lidocaine containing cuff were tolerable than air filled cuffs.

Our study shows diastolic blood pressure (mmgh) 5 minute before extubation significantly decreased in lidocaine group with mean of 66.29 ± 11.055 compared to air group, which shows mean of 72.07 ± 10.165 , p (0.04). Similarly, the diastolic blood pressure (mmgh) 5 minute after extubation has decreased in lidocaine group with the mean value of 65.79 ± 9.195 compared to air group, with a mean of 73.54 ± 9.508 . The p value between the groups shows value of 0.003. This result is comparable to the study done by Soares et al in children's shows diastolic blood pressure among the groups significant with p value of 0.019 (48).

Cough is a protective mechanism induced by rapidly adapting stretch receptors in the tracheal mucosa are believed to be irritant receptors involved in the cough reflex (36). Our result shows incidence postoperative coughs that were recorded at extubation in the PACU show significantly increased proportion of occurrence in air 70% in group compared to 30% in the lidocaine group. The with p value difference between the groups were of 0.026. This result is comparable with the study done by Ahmed et al in children's which founds p value difference among the groups 0.048 . In contrary to our result Soares et al shows, the p value between the groups has not significant difference with p value of 0.419. These may be due to the use of large amount of opioid they use at the end of operation, the cuff pressure throughout the operation was made constant and strict extubation airway manipulation technique they used during their study (48).

Our result shows the incidences of cough at 8-hour post operatively has a proportion of occurrence of 70% in air compared to 30% in lidocaine group. The p value difference between the groups was of 0.163. Both Soares et al and Ahmed et al found the incidence of cough at 8 hour has not significant value with p value of 0.298 and 1.00 respectively is comparable to our result (41, 48). This might be due to cough is a reflex so at this time, there is no irritation to the trachea and throat mucosa that results cough.

Our result shows the incidence postoperative hoarseness in the PACU has lower proportion of occurrence in lidocaine 44.4% compared to 55.6% in air group with p value of 0.567. This result is in line with study done in children's by Soares et al and Ahmed et al shows not significant difference in the incidence of hoarseness at PACU between the groups with p value deference of 0.308 and 0.667 respectively (46, 48). This may be due hoarseness is Mechanical trauma during endotracheal intubation and influence of Cuff pressure during anaesthesia cause edema of vocal cords, these symptom occurs most of the time after 8 hour post operatively.

Our result shows the incidence of postoperative hoarseness after 8 hours shows significantly increased occurrence in air group with the proportion of occurrence 69.6 % compared to 30.4 % in lidocaine group. The p value differences between the groups were of 0.014. This result is comparable with Benzadi et al founds p value difference between the groups < 0.001 . In contrary to our study Soares et al and Ahmed et al shows the postoperative hoarseness in children's at 8 hour has no any difference between the groups with p value of 0.448 and 0.298 respectively. This may be due the cuff pressure monitored throughout the operation was constant and strict extubation airway manipulation technique they used during their study (46, 48).

The activation of pain receptors in the throat mucosa due to the compression of endotracheal tube cuff from over inflation and tube itself can cause postoperative sore throat. Our finding shows the proportion of occurrence postoperative sore throat observed at 8-hour in the groups were 76.9 % in air group and 23.1% in the lidocaine group. With p value difference between the groups ware of 0.027. Our study is comparable with Soares et al observed in his study the proportion of sore throat at 8- hour were 22% in air group and 2% in lidocaine group with p value difference between the groups 0.014. Our finding of postoperative sore throat at 24 hour shows a proportion of occurrence 76.5% in air group compared to 23.5% in lidocaine group. The p value difference between the groups was of 0.009. Our study is in line with Ahmed et al

showed that the postoperative sore throat at 24 hour significantly decreased in lidocaine group with the proportion of (4%) lidocaine and (28%) in air group with p value difference between the groups 0.048. Many other studies in adults and children's shows sore throat decreased significantly in lidocaine-inflated tubes (48).

Regarding the lidocaine group the decreased sore throat is due to continues application of local anesthetic to the tracheal mucosa may reduce the occurrence. An in vitro study showed that a local anesthetic filled cuff diffused through the cough membrane in dose dependent fashion(32)35. Relatively low concentration of lidocaine had the ability to block different sensory tracheal receptors and suppress their action potentials. The reduction in sore throat as a hole is related to anti-inflammatory action of lidocaine. The topical anesthetic effect lasts <8 hour because the half lives of topical lidocaine in children's aged 3 month to 9.5 years is 109 minutes. Lidocaine also exerts the analgesic and anti-inflammatory effect through its action on potassium and calcium channels and on G protein coupled receptors, effect can persist even after decrease in its plasma level. This action can last for several days to weeks thus indicating action on targets other than voltage gated sodium channels, as well as prevention of hypersensitivity in the central and peripheral nervous system. Lidocaine exerts some action on inflammatory reactions through G protein coupled receptors such as lysosomal sensitization and degranulation by neutrophils, oxygen free radical production and cytokine secretion by macrophages and glial cells. The inhibition of calcium channel at pre synaptic nerve terminal plays a major role in neurotransmitter release, with consequent interference in pain impulse propagation (52).

5.1 Limitations

The major limitation of this study was the cuff pressure of the endotracheal tube was not monitored at a constant level the two groups. The lack of a device for monitoring cuff pressure was the reason for this. The other or problem was the difficulty of assessing the postoperative sore throat in this age group. Finally, the global pandemics of corona virus had been created shortage of cases in daily elective procedures in TASH.

5.2 Strength

It will be helpful as base line information for other researchers.

Chapter Seven: Conclusion and Recommendation

Our study analysis and data shows endotracheal tubes that were inflated by alkalized lidocaine instead of room air reduces the postoperative complication associated with endotracheal tube cuff, the tube itself and technical damages. In addition, it can promote reduced hemodynamic changes during extubation and fewer incidences of postoperative sore throat and hoarseness, by using low doses of lidocaine into ETT cuffs in children's undergoing general anesthesia with endotracheal tube for elective procedures.

5.1 Recommendation

A known inflating agent for tracheal tube cuff is room air in many set up, as its disadvantage is not well studied. We recommend that the use of alkalized lidocaine for surgeries that have longer durations in the operation theatre.

Other than in operation theatre, patients that are intubated in the ICU also much benefited from this cuff inflation media.

This research will be used for further studies done to improve such postoperative complication in children's as well as adults that will be done in the future.

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ANNEX

የመጠይቅ ፈቃድ የተከበራችሁ የጥናቱ ተሳታፊዎች የዚህ ጥናት ዋና አላማ በ2012 ዓ.ም በጥቁር አንበሳ ሆስፒታል ቀዶ ጥገና ክፍል ውስጥ ማደንዘገፍ ወስደው አኘራሽን ለሚሆኑ ሕፃናቶች በቀዶ ህክምና ወቅት እና ከቀዶ ህክምናው በኋላ የሚደርስባቸውን ህመም በመገንዘብ የሚደረግ ጥናት ነው። በአጋጣሚ እርስዎም በዚህ እንዲሳተፉ ተመርጠዋል። የዚህ ጥናት ጥቅም እርስዎ በሚሰጡት ምላሽ መሰረት መረጃዎችን በማሟላት በሚገኘው ወጤት መሰረት መረጃዎችን በማጠናቀር ወጤቱን እየተሰራበት ካሆነው ጋር ማገናዘብ እንዲቻል ነው። ጥናቱ በትክክል አላማውን እንዲመታየሥን ድጋፍ እንጠይቃለን። የማንኛውም ግህሥብ ስም አይመዘገብም እንዲሁም ሀሳቡ ብቻውን ይፋ እንዲደግግ አይደረግም ሙሉ በሙሉ በሚስጥር የተጠበቀ ነው። በጥናቱ መሳተፍ አሁን መሳተፍ የራስዎ መብት ብቻ ነው። ግልፅ የሆነ ምላሽንና ክልብ የመነጨ ተሳትፎዎን እንዲሰጡን በአክብሮት እንጠይቃለን። ለመሳተፍ ፈቃደኛነዎት ? ሀ/ አዎ ፊርማ _____ ሆ/ አይደለም

ለመሳተፍ ፈቃደኛ ስህ ሆኑ እናመሰግናለን።

STUDY DETAIL: A COMPARATIVE STUDY ON EFFECT OF TRACHIAL TUBE CUFFS FILLED WITH AIR VERSUS ALKALINIZED LIDOCAINE ON HEMODYNAMIC REASPNSE CHANGES AND POST OPERATIVE LARYNGOTRACHIAL MORBIDITIES IN CHILDRENS.

IN PATIENT NUMBER:

I confirm that I have understood the purpose of procedure for the above study. I have the opportunity to ask question and all my questions and doubts have been answered to my complete satisfaction.

I understand that my participation in the study is voluntary and that I am free to withdraw at any time without giving reason, without my legal rights being affected.

I understand that sponsor of the clinical study, others working on the sponsor’s behalf, the Ethics committee and the regulatory authorities will not need my permission to look at my health records, both in respect of current study and any further research that may be conducted in relation to it, even if I withdraw from the study I agree to this access. However, I understand that my identity will not be revealed in any information released to third parties or published, unless as required under the law. I agree not to restrict the use of any data or results that arise from this study.

Questioners

TABLE 1

SOCIO DEMOGRAFIC, OPERATION TYPE, DIAGNOSIS AND DURATIONS OF ANESTHESIA AND SURGERY

| | | |
|------|--|---|
| S.No | | |
| 101 | AGE IN YEARS | _____ YEAR |
| 102 | SEX | 1.MALE 2.FEMALE |
| 103 | ASA STATUS | 1.I 3.III 2.II 4.IV |
| 104 | MALLAPATY GRADE | 1. GRADE I 3.GRADE III 2 GRADE .II 4. GRADE IV |
| 105 | DIAGNOSIS | 1. 2. 3. |
| 106 | PROCEDURE DONE | 1.GENERAL SURGERY 2.ENT 3.UROLOGY 4.ORTHO 5._____ |
| 107 | DURATION OF SURGERY | _____ HR |
| 108 | DURATION OF ANESTESIA | _____ HR |
| 109 | 1.PRE –ANESTHESIA EVALUATION 2.PREMEDICATION DRUG | 1.YES_____ NO_____ 1.YES 2.NO 3.IF YES_____ |
| 110 | ETT SIZE USED | ID_____ |
| 111 | MONITORING USED | 1.BP 2.SAO2 3.ECG 4.TEMP 4.OTHER_____ |

Table 2

Induction and Maintenance Drugs Used

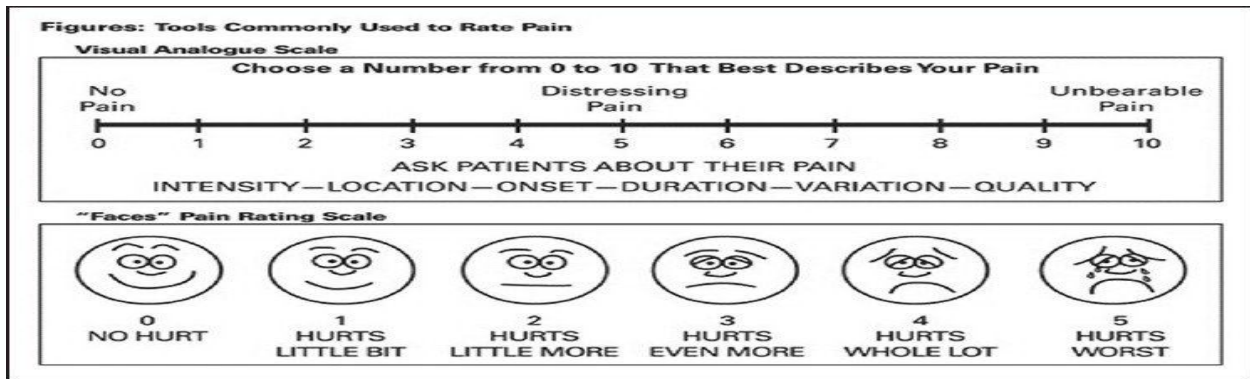
| | | |
|-----|-------------------------------------|--|
| 201 | INDUCTION AGENT USED | 1.KETAMINE 2.THIOPONTAL 3.PROPOFOL 4.RELAXANT_____ |
| 202 | MANTAINANCE AGENT USED | 1.HALOTHANE 2.ISOFLOLANE 3.RALAXANT_____ |
| 203 | USE OF OPOID AND N2O | 1.PETHIDINE 2.TRAMADOL 3. FENTANYL 4. OTHER 5.N2O |
| 204 | INTUBATION ATTEPT | 1.ONCE 2.TWICE 3.MORE |
| 205 | ANY ADVERSE EFFECT TO TRACHEAL TUBE | 1. RUPTURE A. YES--- B. NO---- 2.ACCIDENTALEXTUBATION A.YES B. NO |

TABLE 3

Incidence of Cough and Hoarseness

| | FETURE | YES /NO AFTER EXTUBATION | YES/NO 8 HR AFTER EXTUBATION |
|-----|-----------------------------|---|---|
| 301 | POSTOPERATIVE COUGH | | |
| 302 | POST OPERATIVE HORSENESS | | |

POST OPERATIVE SORE THROAT FETURE



Postoperative pain assessment

For age group between 1-7 FLACC score _____

For age group between 8-14 VAS score _____

TABLE 4

| | FETURE | 8 HR AFTER SURGERY | 24 HR AFTER SURGERY |
|-----|---------------|-------------------------------|--------------------------------|
| 401 | YES | | |
| 402 | NO | | |

TABLE 5

HEMODYNAMIC RESPONSE CHANGES

| | | 5 MIN BEFORE EXTUBATION | 5 MIN AFTER EXTUBATION |
|-----|-----------|----------------------------|---------------------------|
| 501 | HR (bpm) | | |
| 502 | SBP(mmHg) | | |
| 503 | DBP(mmHg) | | |