ADDIS ABABA UNIVERSITY COLLEGE OF HEALTH SCIENCES SCHOOL OF MEDICINE DEPARTMENT OF ANESTHESIA



The Effectiveness of Propofol Versus Inhalational Anesthetics In Preventing Adverse Events Following Deep Laryngeal Mask Airway Removal In Pediatric Patients Undergoing Ophthalmic Surgery, A Prospective Cohort Study

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CERTIFICATION

The under signed certify that the research entitled, The effectiveness of propofol versus inhalational anesthetics in preventing adverse events following deep LMA removal in pediatric patients undergoing ophthalmic surgery, a prospective cohort study is my original work. Any literature and/or data cited in this article is listed in the reference section and any assist done during this period has been given an acknowledgement.

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List of abbreviation

ASA- American Society of Anesthesiology

CI - Confidence Interval

ETT- Endotracheal Tube

EC- Ethiopian Calendar

IV- Intravenous

IOP- Intraocular presure

IQR- Inter-Quartile Range

Kg- Kilogram

LMA- Laryngeal Mask Airway

Mg- Milligram

Mcg- Microgram

O_2- Oxygen

SGA- Supraglotic Airway

Spo_2- Arterial oxygen saturation

SPSS- Statistical Package for Social Sciences

SD- Standard Deviation

TCI- Target Controlled Infusion

URTI- Upper Respiratory Tract Infection

Abstract

Background: Airway manipulation in a light plane of anesthesia when removing airway device is associated with airway reflex like coughing causing increased heart rate, elevated blood pressure and ultimately, a rise in intra ocular pressure which is undesirable in ophthalmic surgical procedures. Propofol reduce airway reflex and are used for deep LMA removal. In the past the respective advantages and dis advantage of using Propofol for airway device removal have led to conflicting results.

Objective: To compare the effectiveness of Propofol versus inhalational anesthetics in preventing adverse events following deep LMA removal for pediatric patients undergoing ophthalmic surgery at selected governmental hospitals in Addis Ababa, Ethiopia from January 2023 to April 2023.

Methods: In this multi-center prospective cohort study 110 American Society of Anesthesiologists (ASA) physical status I and II pediatric (aged 1-8 year) patients who underwent ophthalmic surgery under general anesthesia with laryngeal mask airway, recruited by a systemic random sampling technique were included. Study participants were grouped as group P if anesthesia providers decreased inhalational to MAC awake and administered Propofol (0.5-1mg/kg) one minute before LMA removal and as group I if the anesthesia provider discontinued inhalational and removed LMA immediately after. Airway adverse events, hemodynamic changes and emergence duration was recorded. Data was analyzed by using SPSS version 26. Normality of the data was checked using Shapiro-Wilk test and analyzed using student t test for normally distributed data and chi-square test for categoricldata. Non-parametric data was analyzed using Mann –Whitney U test and p-value less than 0.05 was considered as statistically significant.

Result: comparison of data from Propofol with inhalational group and inhalational alone group using chi square showed that the incidence of airway related adverse events was significantly lower in group P (38.2%) than group I (58.2%), $p< 0.05$.There was no significant difference in hemodynamic changes and emergence duration ($p>0.05$) between the two groups.

Conclusions and Recommendation: We conclude that adding Small dose Propofol (0.5-1mg/kg) to inhalational MAC awake 1minute before LMA removal prevents adverse events following LMA removal in pediatric ophthalmic surgery. We recommend anesthetisis to add 0.5-1mg/kg of propofol to inhalational MAC awake one minute before LMA removal to prevent adverse events following ophthalmic procedures. We also recommend further randomized control to avoid bias.

Chapter one: Introduction

1.1. Background

Ophthalmic surgery requirea an anaesthetic technique that does not cause an increase in intraocular pressure (IOP); a smooth induction and emergence is important to avoid airway stimulation.(1) Routinely, ophthalmic surgeries are performed under topical or regional anesthesia. However, in pediatric patients, this might be unattainable and general anesthesia with endotracheal intubation is commonly perceived as the first choice. Unfortunately, laryngoscopy and endotracheal intubation as well as extubation are associated with coughing, increased heart rate,elevated blood pressureand ultimately, a raise in intraocular pressire, which is undesirable in ophthalmic surgical patients.(2) Use of the LMA allows smoother induction and emergence from anaesthesia and has much less effect on IOP.(3)

Since LMA was developed by Dr. Brain in 1981, it has been used to treat millions of patients worldwide and its use has only been growing. The LMA avoids many of the complications associated with endotracheal intubation, allows rapid recovery without the need for muscle relaxation(4) and maintains a significantly better hemodynamic stability at induction and during emergence,(5) which led to its increased use in short to medium duration ophthalmic surgical procedures.(2)

Use of a laryngeal mask (LMA) is associated with a reduction in adverse events compared with an endotracheal tube in order children (>1 year of age).(6) However, airway complications happen frequently following air way removal and during the recovery period due to airway manipulation in light planes of anesthesia.(7) In addition to other factors depth of anesthesia, the choice of anaesthetic drug, and age of the patient may contribute to airway hyper-reactivity at extubation time(8) Airway adverse events, such as laryngospasm, cough and oxygen desaturation, are frequently encountered in pediatric patients following airway device removal.(9) These adverse events are associated with hemodynamic changes causing a raise in intraocular pressure, which is undesirable after ophthalmic surgical procedures.(2)

There is a great deal of practice variability among clinicians when removing the pediatric laryngeal mask airway (LMA).(12) Anesthetists prefer deep removal of endotracheal tubes and

supra-glottic airways to reduce airway stimulation and airway reflex.(13) Extubating patient while still breathing 1.5 time the minimum alveolar concentration (MAC) of inhaled anesthetic regarded as deep removal by medical literatures.(11) However, attaining intact airway reflexes, unobstructed airway, smooth emergence and shorter recovery time following LMA removal are still challenges of pediatric anesthesia.(14)

Deep airway device removal is recommended when managing pediatric patients to minimize overall airway adverse events except airway obstruction.(15) In a review that included 15 RCTs conducted on 2242 participants it was reported that coughing was less frequent follo deep LMA removal. However, airway obstruction was more likely after deep removal.(16)

Likewise, a cohort study done in Ethiopia by Hika et al. Including children aged 2 to 8 years who underwent ophthalmic surgery showed that the incidence of airway adverse events (coughing, airway obstruction, breath holding, excessive salivation and LMA bitting related to removalof LMA inn deep plane of anesthesia to be lower than awake groups except desaturation which was reported to be higher in deep group. (10)

Investigators recommended to use different techniques like lateral positioning of children(10) and use of different drugs like, LMA removal under deep anesthesia technique of low dose Propofol with Isoflorane (14), application of topical lidocaine anesthesia(7), Administration of Propofol or combination of Ketofol. (17), Intravenous administration of small dose of Propofol or Midazolam,(18) reduce adverse events following LMA removal. However, some of the techniques were reported to work for specific cases or not to have significant effect on deep LMA removal and some techniques were associated with significant change in patient's hemodynamics.

1.2. Statement of the problem

Ophthalmic surgical procedures are associated with unique complications, like increased intraocular pressure (IOP) and/or bleeding during airway device removal and emergence from anesthesia.(19) Removal of airway device is associated with a 50% rise in IOP compared to pre-removal time.(4) Moreover, Air way complications such as coughing, straining and bucking increase intraocular pressure up to 50 mmHg causing supra-coroidal hemorrhage due to rupture of vessel wall.(11) Incidence of Supra-choroidal hemorrhage is reported as high as 6.1% following ophthalmic surgeries, leading to a total blindness in 17% of patients with event of supra-choroidal hemorrhage (1)

In Ethiopia the incidence of airway complications during LMA removal is reported to be as high as 71% and 48.4% in awake state and deep state respectively, following ophthalmic surgery.(10) Studies shows that the incidence of Coughing and (15.1%) and Straining (3.8%) following removal of LMA in a deep plane. Removal of LMA in awake patient while the airway is intact and highly reactive to a stimulus further increases the chance of air way complications.(20)

Although deep LMA removal is believed to be a safer option for the pediatric population due to reduced risk of coughing, breath holding and laryngospasm(14), The residual effect of inhalational anesthetic drugs used for deep LMA removal are highly associated with reduced airway reactivity and decreased airway patency postoperatively.(21) Airway obstruction due to depressed airway reflexes and collapse of upper airway is encountered frequently during deep anesthesia. (22) This increased tendency of the airway to closure is one of the commonest causes of the most feared complication in pediatric anesthetic management, Hypoxia. (19)

Propofol has a well known preventive effect on emergence complications in children at sub-hypnotic dose,(17) Some anesthesia providers argue that administration of Propofol at the end of surgery should be part of every child's anesthetic management, others suggest to avoid this practice regarding the potential disadvantages, including the possibllity of delayed awakening, hypotension and bradycardia.(23)

1.3. Research Hypothesis

- HO_1:-There is no difference in the incidence of airway adverse events between Propofol with inhalational and inhalational alone groups
- HA_1:- There is a difference in the incidence of airway adverse events between Propofol with inhalational and inhalational alone groups
- HO_2:- There is no difference in hemodynamic changes between Propofol with inhalational and inhalational alone groups
- HA_2:- There is a difference in hemodynamic changes between Propofol with inhalational and inhalational alone groups
- HO_3:- There is no difference in emergence duration between Propofol with inhalational and inhalational alone groups
- HA3:- There is a difference in emergence duration between Propofol with inhalational and inhalational alone groups

1.4. Justification of the study

Ophthalmic surgery presents a unique challenge of maintaining intra occular pressure throughout the procedure and during emergence. LMA is inserted simply and blindly into the pharynx so that it avoids the change in IOP due to invasive instrumentation of laryngoscope for intubation; it also provides a definitive airway compared to facemask specially in ophthalmic surgery in which working area is shared between the anesthesia and surgical team. Safe and effective management of pediatrics patients undergoing ophthalmic surgery needs an adequate skill and evidence based practice in all aspects.

Although, LMA has advantage of easy insertion its removal it is associated with several unwanted outcomes. Because LMA removal in awake state after the patients airway reflexes recover increases the liability of patients to airway hyper-reactivity and cause changes in the patient's hemodynamics it affects the intraocular pressure deep LAM removal is preferable in ophthalmic surgery. There has been considerable research conducted on different methods to prevent or reduce adverse events following LMA removal in pediatric patients, but the efficacy of each methods with their own side effect is not studied well.

LMA removal in deep state is used routinely after ophthalmic surgery and it is associated with decreased adverse events. Investigators recommend different techniques and drugs for deep LMA removal; however, in the study hospitals, deep anesthesia is routinely attained either with inhalational anesthetics or by adding Propofol. Beside most of the recommended drugs are either not available in our set up or the drugs are expensive in market. Furthermore, using additional drug specifically for LMA removal is not a routine practice as it may increase the risk of patient's exposure to more drugs and financial liability.

In the study hospitals, Propofol 0.5-1mg kg^{-1} is routinely administered at the end of surgery when managing pediatric patients for its known preventive effect on emergence agitation and postoperative nausea and vomiting. However, the use of this drug for LMA removal in set ups like ours is far from being confirmed as there is no study done to assess its effectiveness or safety in Ethiopia and there are a few published studies internationally.

LMA is a safer and more efficient airway management alternative. However, anesthetists tend to adhere to the routine endotracheal intubation. Conducting such a research comparing two techniques to determine optimal technique in prevention of adverse events following LMA removal will help promote use of LMA for pediatric patients by combating the commonest complications of its use; help establish an effective optimization of available resource and reduce financial burden for patients. This study will also provide Safe and effective alternative for LMA removal and enhance evidence based practice. It also can be used as a background for future researches on related topics.

Chapter two: Literature review

Management of anesthesia during ophthalmic surgery mandates the control of IOP in the perioperative period, since raised IOP may cause permanent loss of vision. Several factors related to anesthesia including changes in the blood and intrathoracic pressure, and may influence IOP. An increase in IOP may happen on intubation due to laryngoscopy, however it happens more frequently during the time of extubation and the recovery period due to increased airway manipulations, rise in blood pressure, hypoventilation and hypercapnia.(25)

1.5. Inhalational anesthetics for LMA removal

A study done in The United Kingdom, 2015, by Thomas-Kattappurathu et al. on 216 participants aged 1 to 16 years scheduled for elective surgery including ophthalmic surgery, reported incidence of airway- related complications following LMA removal in deep state with 2.2% sevoflurane to be 50% in supine position and 15.4% in lateral position.(12)

In contrary, a randomized controlled trial done in South Korea, in 2012, J.-S. Park et al. reported LMA removal in deep state with 2.2% sevoflurane reduces the frequency of airway related complications (Coughing, LMA biting, excessive secration and desaturation) by 95%. Deep LMA removal was also reported to have lower mean emergence time (5.9 ± 1.7 6.0 minutes).(26)

A Systemic Review and Meta-Analysis by Koo, Chang-Hoon et al. in 2018, Seoul, Korea, including 17 randomized trials, and a total of 1881 pediatric patients. The study indicated that extubation and LMA removal in deep anesthesia with inhalational anesthetics reduces the risk of overall airway complications, cough and desaturation, however increases the risk of airway obstruction in children after general anesthesia.(15)

In a study done in Pakistan by Abbasi, Shemila et al. in 2022 including 106 patients airway related adverse events following deep LMA removal with 1.3 MAC isoflurane was reported to be Laryngospasm (9.4%), Airway obstruction (33.9%), Cough (15.1%), Peripheral oxygen desaturation (<95%) (11.3%) and Straining/biting (3.8%).the study also stated that using the

technique of removal of LMA in a deep plane was associated with shorter time during emergence.(20)

A cohort study done in Ethiopia by Hika et al. in 2017 reported the incidence of airway complication to be (coughing (6.5%), upper airway obstruction (35.5%), breath holding (3.2%), excessive salivation (12.9%), and LMA biting (0%)) and higher incidence of desaturation (22.6%) following LMA removal under deep anesthesia with inhalational anesthetics.(10)

1.6. Propofol for LMA removal

An investigation by Huang et al. in Taiwan, 2016, using TCI-administered Propofol anesthesia with a concentration of 2.0 mg/ml in adult patients, suggested more successful LMA removal in patients under deep anesthesia than in fully awake patients. LMA removal failure rate was more in the 'awake' group (24.6%) than in the "deep'' group (8.3%). Airway hyper-reactivity was mild (score,<3) in both groups.(27)

Propofol blunts noxious airway reflexes hence can prevent airway complications if given before airway device removal. A study by Iqbal et al. done in Pakistan, 2017, including 80 patients aged 4-12 years undergoing tonsillectomy lower incidence of larengospasm (3%) was reported in children who received propofol 1 mg/kg injection before airway device removal after discontinuation of inhalational anesthesia compared to incidence of laryngospasm (42%) in children who received no Propofol injection. (28)

Another study done in Iran, 2021, by Hosseini, H., Ayatollahi, V., Rahimianfar, A.A. et al. to assess the effect of low-dose of propofol on the respiratory complications immediately after tracheal extubation in children undergoing tonsillectomy, 0% incidence of laryngospasm was observed inchldren who received 0.5 mg Propofol/kg injection before airway device removal. However, in the control group, 14.3% of patients had mild laryngospasm, (p value = 0.04). In addition, the incidence of cough and nausea post-toncillectomy was 8.5% in the control group and 0% in the intervention group.(9)

In a studydone in India, 2006, by Kaur s et al. to compare airway device removal related complications after anesthesia with Oxygen 40% + Nitrous oxide 60% + Halothane 0.75 – 1% in

patients who took Propofol 1 mg kg-1 before airway device removal and control group; they reported incidence of bucking 12(48%) in control group as compared to 3(12%) in Propofol group, (p= 0.006). Similarly, breath holding occured in 12(48%) patients in control group versus 3(12%) in Propofol group (p = 0.006). Laryngospasm, was seen in 6(24%) patients in control group compared to 0 in Propofol group (p = 0.03). Cyanosis occurred in 2 (8%) patients in control group. Baseline mean pulse rate in control group was 99.2 (±12.56) beats/minute and 93.6 (±10.13) beats/min in Propofol group. In the control group, an increase in systolic blood pressure after suction and up to first 5 minutes after airway device removal compared with the baseline value ($p<0.001$) was reported. In Propofol group, there was fall in systolic blood pressure after Propofol ($p<0.001$). Recovery from anesthesia in Control group was delayed in 8(32%) patients versus 1 (4%) patient in Propofol group.(29)

Gebeyehu G, et al. in a cohort study they conducted in 2020 in Ethiopia comparing patients who took Propofol(0.5 mg/kg) at the end of surgery (Propofol group) and control group, the incidence (42.4% and 9.1% respectively) and severity of laryngospasm following tracheal extubation in children undergoing tonsillectomy was significantly lower in Propofol group ($p>0.05$). The difference in mean heart rate and mean arterial blood preasure at end of surgery, after extubation, 5min, 10min, 15min, 20min and 30min.($p<0.05$) was not statistically significant in both groups the median SpO_2 was lower in control group immediately after extubation and 10 min after extubation($p<0.005$).(19)

In contrary to these, a randomized control trial study done in Thailand,2022, by Yanipan et al. Including 120 participants under-going general anesthesia who were assigned into three groups; Patients who received intravenous 0.25mg/kg Propofol (P-group), while patients who received intravenous 0.25mg/kg Propofol plus 0.15mg/kg Ketamine (PK-group) and patients who received intravenous 0.9% NaCl (C-group) one minute before extubation. Between comparison groups the study reported no significant difference in the incidence and severity of laryngospasm. Patients in the PK-group (25%) showed a significantly reduced incidence of postoperative cough,the P-group (55%) and C-group (72.5%) ($P< 0.005$). The severity of cough was also significantly lower in the PK-group than in the P-group and C-group ($P=0.039$) and $P<0.001$,respectively.(30)

Propofol has many pharmacologic advantages than other anesthetic drugs but regarding its use in children there are both supporting and discouraging literatures.Even though the common induction dose of Propofol (1 to 3 mg kg^{-1}) is widely used in clinical practice for its known inhibitory properties on airway reflex, its administration is followed by apnea for several minutes in most patients,(9) Although a single dose intravenous administration of Propofol before emergence has been reported to be effective in preventing waking laryngospasm and coughing in children,(18) when LMA is removed deep, the exposure of an unprotected airway with depressed airway reflexes is known to increase risk of airway obstruction. (15)

1.7. Inhalational anesthetics versus Propofol for LMA removal

In randomized control trial done in Pakistan, 2019, by Kumar, Dileep et al. Larengeal mask airway removal under deep anesthetic technique of low dose Propofol with isoflurane (administered before LMA removal) was found to be associated with reduced adverse airway events than removal under deep anesthetic technique with isoflurane alone in pediatric patients. Incidence of airway obstruction and teeth clenching was significantly higher in isoflurane alone group ($p<0.05$ each). Emergence time was also significantly higher in isoflurane alone group ($p=0.001$). The incidence of coughing and bucking was 4(16%) in non Propofol group and 1(4%) in Propofol group. Hyper-salivation was observed in 3(12%) patients in non Propofol group and 4(16%) in Propofol group. Hypoxia 2(8%) and laryngospasm 1(4%) were seen in non Propofol group only. Teeth clenching in non Propofol group was 7(28%) versus 1(4%) in Propofol group, and airway obstruction was higher in Propofol group 9(36%) versus 3(12%) in non propofol group. Emergence timing was significantly shorter in Propofol grou than isoflurane group($p=0.001$).(14)

1.8. Conceptual frame work

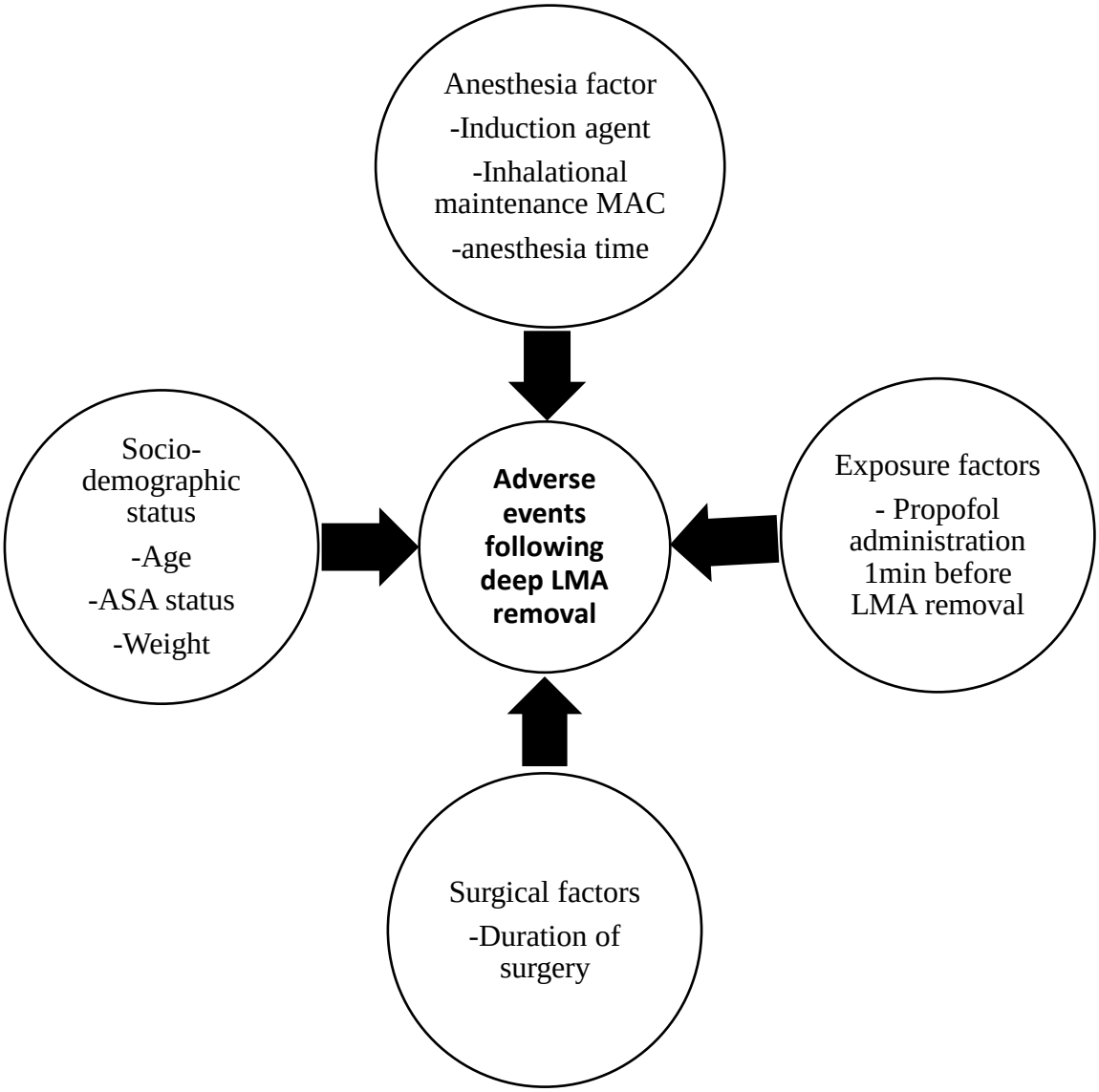


Figure 1. Facors affecting Adverse events following deep LMA removal (8)

Chapter Three: Objective of the Study

3.1. General Objective:

- To compare effectiveness of Propofol versus inhalational anesthetics in preventing adverse events following deep LMA removal for pediatric patients undergoing ophthalmic surgery at selected governmental hospitals in Addis Ababa, Ethiopia from January 2023–April 2023

1.9. Specific Objective

- To compare incidence of airway adverse events between Propofol with inhalational and inhalational alone groups following deep LMA removal in ophthalmic surgery.
- To compare hemodynamic changes between Propofol with inhalational and inhalational alone groups following deep LMA removal in ophthalmic surgery.
- To compare emergence duration between Propofol with inhalational and inhalational alone groups following deep LMA removal in ophthalmic surgery.

Chapter Four: Methods and Material

4.1. Study Area

The study was carried out in purposively selected two governmental (Minillik II Referral Hospital and Saint Paul Hospital Millennium Medical Collage) hospitals in Addis Ababa from January 2023 to April 2023; the purpose of selection was the higher number of pediatric patients undergoing ophthalmic surgery in these two hospitals compared to others.

Addis Ababa is the largest city in Ethiopia, Based on 2012 (EFY) figures from the Central Statistical Agency of Ethiopia, the Addis Ababa Region has an estimated total population of 3,686,068. An estimated area of 526.99 square kilometers, this region has an estimated density of 5,535.8 people per square kilometer.

Minillik II Referral Hospital was established in 1910 EC at Yeka sub-sity. The hospital is one of largest hospital in Ethiopia. It is now the main health center that offers high quality comprehensive health services to patient from all over the country with affordable cost, The hospital is well known by ophthalmic surgery. there are six operation tables in the ophthalmic operation department. One of the tables is reserved for pediatric ophthalmic procedure.

Saint Paul Hospital Millennium Medical Collage is one of teaching and referral hospital in the country located in Addis Ababa the capital city of Ethiopia around Swaziland Street. It was established in 1969 G.C. by Emperor Haile Selassie with the help of German evangelical church, it was aimed at serving the poor. The hospital become a medical collage in 2007G.C. It has 13 departements in ENT and ophthalmic operation theatre daily surgeries are done.

4.2. Study Design and Study Period

A multi center Prospective observational cohort study design was conducted from January 2023 to April 2023 G.C.

4.3. Population

4.3.1. Source population

All pediatric patients scheduled for elective ophthalmic surgery at Minillik II Referral Hospital and Saint Paul Hospital Millennium Medical College. Addis Ababa, Ethiopia.

4.3.2 Study population

All pediatric patients scheduled for elective ophthalmic surgery under general anesthesia with LMA who meet the inclusion criteria, at Minillik II Referral Hospital and Saint Paul Hospital Millennium Medical College during the study period.

- Exposed group – patients in whom inhalational anesthetic was decrease to MAC awake and small dose Propofol (0.5-1 mg/kg) was administered 1 minute before LMA removal
- Non- exposed group – patients in whom LMA was removed immediately after inhalational anesthetics discontinuation without Propofol administration.

4.4. Study Variables

4.4.1. Dependant variables

- Airway adverse events
- Hemodynamic changes
- Emergence duration

4.4.2. Independent variables

- Socio demographic variables (Age, Weight, Sex and ASA)
- Induction drug
- Duration of surgery
- Duration of anesthesia
- Inhalational MAC before discontinuation
- Propofol administration 1min before LMA removal

4.5. Eligibility criteria

Pediatric patients scheduled for elective ophthalmic surgery under general anesthesia at Minilik II Referral Hospital and Saint Paul Hospital Millennium Medical College. Addis Ababa, Ethiopia.

4.5.1. Inclusion criteria

ASA I and II pediatric patients age 1-8 years undergoing elective ophthalmic surgery under general anesthesia with LMA.

4.5.2. Exclusion criteria

- Children who have history of chronic respiratory disease
- Children in whom LMA was removed awake
- Children in whom LMA insertion attempted more than 3 times
- Children who took IV lidocaine after LMA insertion
- Children maintained with Halothane
- Children maintained with IV anesthetics
- Children who have history of excessive preoperative fasting

4.6. Sample Size determination and Sampling technique

4.6.1. Sample size determination

Sample size for the study was calculated using Epi info Version 7 based on the following assumptions; significance level 5% (α=0.05), power of study (1-β) of 80% considering one to one ratio of the Propofol with inhalational and inhalational alone groups with the assumption of a P value <0.05 as statistically significant and a power of 80%. By using double proportion formula, sample size was calculated to be 100 (50 patients each). Adding 10% non-response rate the total sample size was 110 (55 subjects to each group).

According to a study done in Pakistan a statistically significant incidence of airway complication after LMA removal was reported to be 9(36%) patients in isoflurane group versus 3(12%) patients in Propofol group.(14)

$$N = \frac{\left(Z_{\alpha/2}\sqrt{2p(1-p)} + Z_{1-\beta}\sqrt{p_1(1-p_1)p_2(1-p_2)}\right)^2}{(p_1 - p_2)^2}$$

$$p = \frac{(p_1 + p_2)}{2},$$

N=.Total sample size among groups

$Z_{\alpha/2}$=1.96 = value of the standard normal distribution corresponding to a significance level of α(1.96 for a 2-sided test at the 0.05 level)

Z_{β}=0.84 = value of the standard normal distribution corresponding to the desired level of power

(0.84 for a power of 80%)

P_1=proportion of patients in whom LMA was removed with inhalational alone

P_2= proportion of patients in whom LMA was removed with Propofol additon

r = ratio of inhalational anesthetics group and Propofol group

p_1= 0.12 and p_2 = 0.36 r=1

p = 0.12 + (1*0.36)/ 1+1 = 0.48/2 = 0.24

q = 1-0.24 = 0.76

$n_1 = \frac{(1.96+0.84)^2 \times 0.24 \times 0.76(1+1)}{1(0.12-0.36)^2} = \frac{2.86}{0.057} = 49.65$

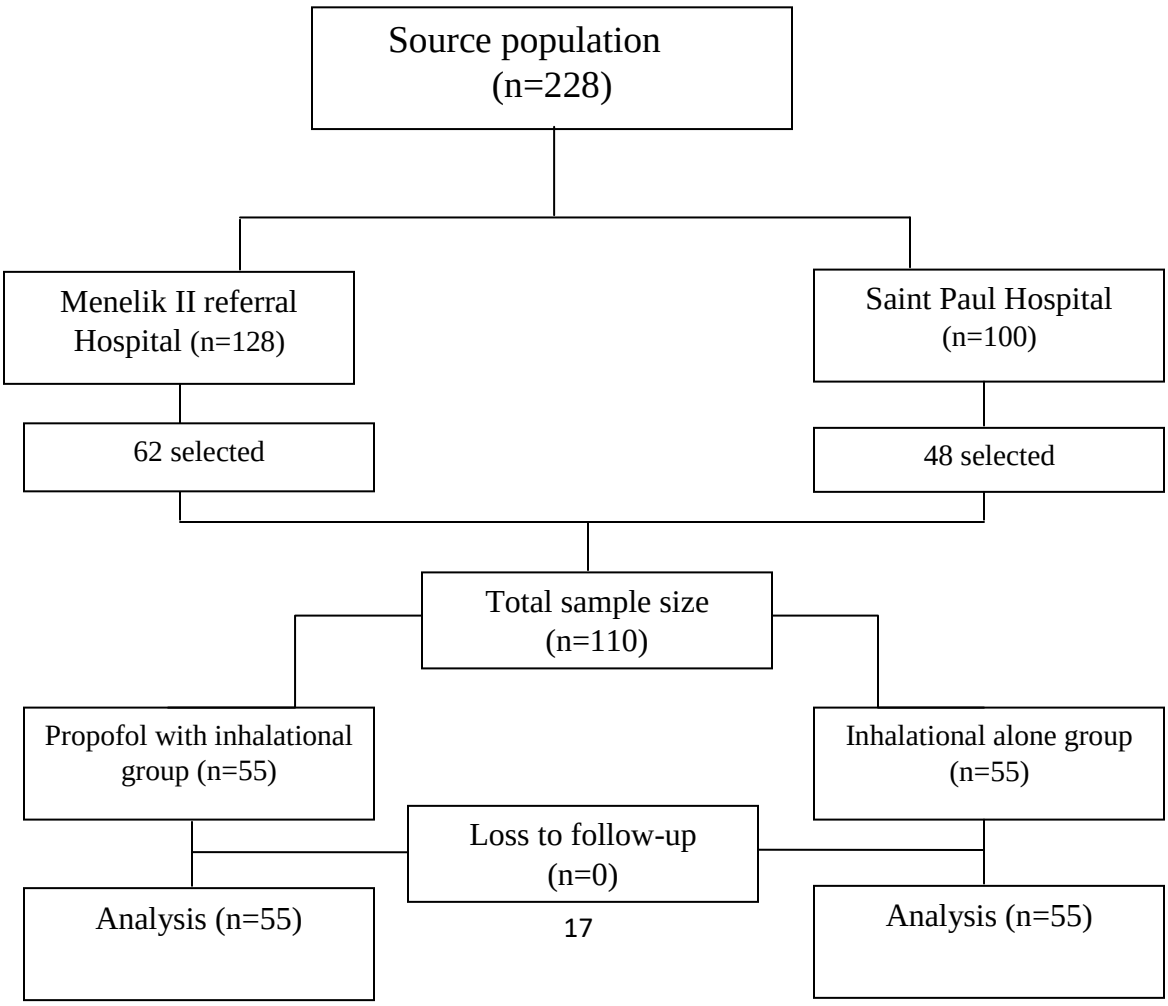
n_1= 49.56~50,

By adding 10% non-response rate n_1 = 55, n_2= 55

4.6.2. Sampling technique

A study participant was selected using systematic random sampling technique from daily operation schedule list until the required sample size is obtained.

Based on a situational analysis done prior to data collection time, 228 patients, 128 at Menelik II referral Hospital and 100 patients at Saint Paul Hospital Millennium Medical College were estimated to undergo optalmic surgery during the data collection time; based on this, sample allocation to each hospitals was, Menelik II referral Hospital =128/228 *100=56.1%~(62 patients) and Saint Paul Hospital Millennium Medical College 100/228 *100=43.8%~(48 patients). From sample size n=110 the sample interval is calculated as K^{th} =N/n; 128/62=2.06 and 100/42=2.3. Since systematic random sampling was approximately 2, every 2nd scheduled patient was selected as a study unit. The first sample was selected by lottery method from patients who met the inclusion criteria scheduled on the first day of the study period.



4.7. Data Collection Tool and Procedure

Data was collected from January 2023 to April 2023 in selected areas using pretested questionnaires which was performed with 5% of total sample size in Minillik II Referral hospital 1 week before data collection started which was not included in the study. Questioner was prepared in English by modifying the questionnaires used by Hika et al.(10)and Gebeyehu G, et al.(19); it includes demographic data, patients ASA class, type and dose ofinduction agent used, type of anesthesia drug for maintenance. The questioner also includes observed airway related adverse events, hemodynamic changes and emergence time.

A trained two BSc. anesthetists was assigned for data collection process at each study area. The data collectors was supervised by the investigator. The date collectors was only observing and recording during data collection time.

Anesthesia management for ophthalmic procedures in study hospitals are usually carried out by BSc and Msc anesthesia professionals. Per practice all patient were pre-oxygenated with 100% oxygen via face mask before induction of anesthesia and standard monitors were applied. After premedicating the children with atropine (0.02mg/kg I.V) and fentanyl (2mcg/kg I.V), patients were induced with IV induction agents (propofol/ketofol). The hospital anesthetists chose the appropriate LMA size based on the patient weight. They did not use any muscle relaxant for the insertion of the LMA, and let patients to breathe spontaneously throughout the procedure. Anesthesia was maintained with oxygen and inhalational agents (either halothane or isoflurane).

At the end of surgery, deep LMA removal is performed in two ways, after the surgery is concluded and surgical drape is removed some anesthetists prefer to discontinue inhalational anesthetics and then remove LMA immediately after. While other anesthetist prefer to decrease inhalational anesthetics to MAC awake and administer small dose Propofol ranging from 0.5-1 mg/kg 1 minute before LMA removal. In both conditions, they removed the LMA with the cuff remained inflated. After the removal, they immediately administer 100% O_2 via a facemask.

A close observation, by assigned data collectors started at the time of inhalational anesthetics discontinuation and continued up until 20 minutes after LMA removal. If the anesthetist

discontinued inhalational anesthetics and then remove LMA immediately after, patients were grouped in inhalational alone group (group I). If the anesthetist decreased, inhalational anesthetics to MAC awake and administer small dose Propofol (0.5-1mg/kg) 1min before removing LMA, patients were grouped in Propofol with inhalational group (group P). In the observation, the data collectors followed the patient and recorded airway related adverse events (breath holding, laryngospasm, coughing, upper airway obstruction, excessive salivation, vomiting and retching). The mean arterial pressure (MAP), heart rate (HR) and oxygen saturation (SpO_2) was recorded before inhalational discontinuation, after inhalational discontinuation, after LMA removal, 5 min, 10 min, 15 min and 20 min after LMA removal. The emergence duration was also recorded.

4.8. Data Quality Assurance and Pretest

To assure the quality of the data, data collectors were given a training, and the investigator made a regular supervision and follow up. In addition, regular checkup for completeness and consistency of the data was done on a weekly basis. Once the data was collected, checked for completeness, consistency and accuracy, it was sorted, categorized and summarized.

4.9. Data Processing and Analysis

After finishing data collection process the questionnaire was checked manually for completeness. The data was coded, entered and cleaned using Epinfo version 4.6, and analyzed using SPSS version 26. After normality of data was checked using Shapiro-Wilk test, numeric data were described in terms of mean and SD for normally distributed data; non-normally distributed data were described using median. Comparison of numerical variables between study groups were studied using an independent t- test for normally distributed data and a Mann-Whitney U-test for non-normally distributed data. A chi-square test was employed to compare categorical variables. A statistical significance was determined at the p-value of less than 0.05.

4.10. Ethical Considerations

Ethical clearance was obtained from the department ethical clearance committee 29////2022/2023) before the start of data collection and official support letter was issued to all

listed hospitals to get permission for data collection. An oral informed consent was obtained from each voluntary attendant of study participants after giving full information about the use and importance of conducting the study i.e involvement to the study is on voluntary basis. Confidentiality was assured at all levels of the study by avoiding personal identifiers and using codes to identify participants.

4.11. Dissemination plan

The final research paper will be given to Addis Ababa University Departement of Anesthesia and federal ministry of health. The result may be presented on main workshop, seminars and conference so that the stakeholder, anesthetist, will be aware of the relative efficacy and side effects of the study drugs for LMA used. It will be published as journal article.

4.12. Operational Definations

ASA I – A normal healthy patient

ASA II- A patient with mild systemic disease

Airway adverse event following LMA removal – episode of airway obstraction, larengospsdm, pheripheral hemoglobin oxygen saturation less than 90%, strider requiring airways manipulation vomiting, retching, or excessive salvation.(10)

Breath holding – cessation of breathing more thon 5 sec (10)

Coughing – Involuntarily air expelling from the lungs suddenly with a harsh noise.

Excessive salivation – salivation requires suctioning after LMA removal (19)

laryngospasm- A closure of the airway that blocks the passage of air and which necessitates intervention such as positive pressure ventilation or Propofol or suxamethonium injection.(10)

Airway obstruction - an obstruction to air entery requiring application of jaw thrust or chin lift or the use of gudel air way.

Vomiting – the ejection of matter from the stomach through the esophagus and mouth(10)

Retching - a strong and involuntary effort to vomit. (10)

Emergence duration – time duration from discontinuationof anesthetic drug to first cry (26)

Patients who aroused from anesthesia within 20 minutes - "Normal". Patients who aroused from anesthesia after 20 minutes -"Delayed".(29)

Deep LMA removal - Immediate removal of LMA after discontinuation of anesthetic agents and assuring adequate ventilation. (10)

Isoflurane MAC awake– MAC less than or at 0.4 (14)

Excessive preoperative fasting – patients going up to 16 h and longer without a drink(31)

Chapter Five: RESULT

5.1. Socio demographic characteristics

A total of 110 participants were enrolled in this study, 55 in each group. Socio-demographic data were comparable in both groups. The study included 55 male and 55 female patients, the mean age was 4.2 years. Socio-demographic data is shown in **Table 1**. Results are presented in number (percentage) except age. Age was presented in mean ± standard deviation (SD).

Table 2. Demographic characteristics of pediatric patients at Minilik II Referral Hospital and Saint Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia, from January 2022 to April 2023 G.C

	Propofol with inhalational group	Inhalational alone group	P value
Age(mean±SD)	4.33±2.480	4. 07±2.268	0.575
Sex n(%); Male	30 (27.3%)	24(21.8%)	0.252
Female	25 (22.7%)	31(28.2%)	
Weight(mean+SD)	16.56±4.803	15.89±4.188	0.435
ASA n(%); I	45 (40.9%)	50 (45.5%)	0.165
II	10 (9.1%)	5 (4.5%)	

NB. SD= Standard deviation, ASA= American society of anesthesiologist, MAC= minimum alveolar concentration, n: Independent T test and chi square test were used; p-value <0.05 considered statistically significant.

5.2. Intra-operative characteristics

Intra-operative characteristics were comparable between the groups. Anesthesia was induced with Propofol in 40 patients and with Ketofol in 70 patients, the mean duration of anesthesia was 25.8 minutes. Intra-operative characteristics data is shown in Table 2. Results are presented in mean ± standard deviation (SD) and as in number (percentage).

Table 3. Demographic and operative characteristics of pediatric patients at Minilik II Referral Hospital and Saint Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia, from January 2022 to April 2023 G.C

	Propofol with inhalational group	Inhalational alone group	P value
Anesthesia time (min) (mean+SD)	28.07±7.213	25.93±6.330	0.094
Surgery time (min) (mean+SD)	22.31±6.304	20.64±5.495	0.673
Induction agent n(%)			
Propofol	21 (19.1%)	19(17.3%)	0.692
Ketofol	34 (30.9%)	36 (32.7%)	
Maintenance inhalational MAC (mean+SD)	2.4380± 0.467	2.3519± 0.462	0.472
Anesthesia time(min) (mean+SD)	28.07±7.213	25.93±6.330	0.094

NB. SD= Standard deviation, ASA= American society of anesthesiologist, MAC= minimum alveolar concentration, n: Independent T test and chi square test were used; p-value <0.05 considered statistically significant.

5.3. Airway Related Adverse Events

Airway related adverse events following LMA removal were noted in 53 (58.3%) patients totally, 21 (38.2%) patients in whom Inhalational was decreased to MAC awake and Propofol was administered before LMA was removed (group P), and 32 (58.2%) patients in whom LMA was removed immediately after inhalational discontinuation (group I). A chi squre test of the incidence of airway related adverse events between the two groups showed p = 0.036.

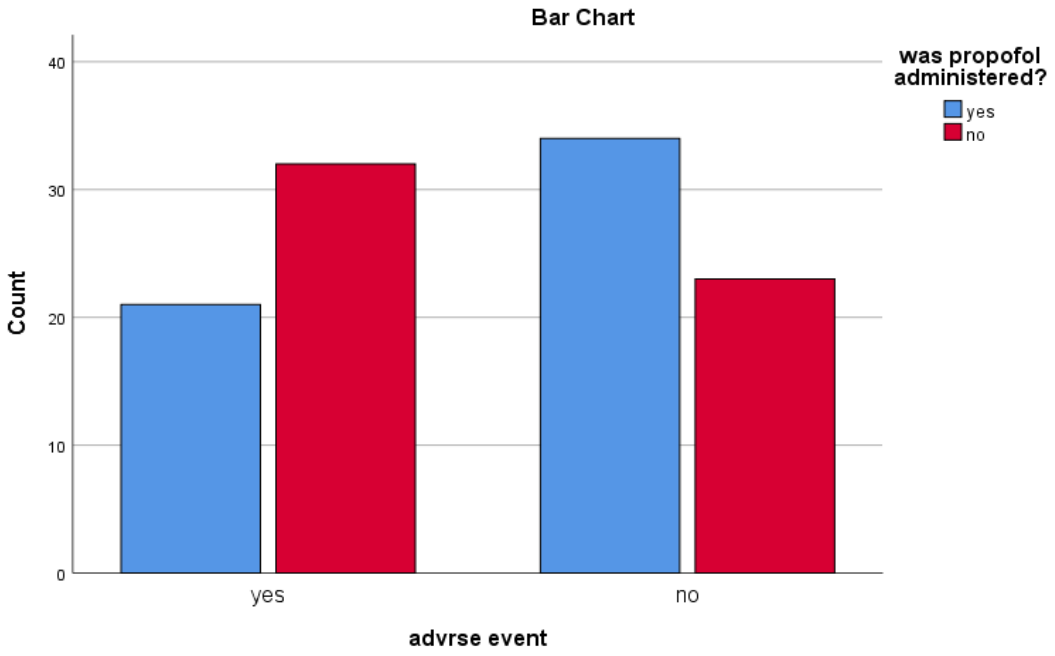


Figure 2. A graph showing the incidence of airway related adverse events at Minilik II Referral Hospital and Saint Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia, from January 2022 to April 2023 G.C

The number of patients with airway related adverse events following deep LMA removal in each group is shown in **Table 4**. Laryngospasm was seen only in inhalational alone group. LMA biting, retching and vomiting did not occur and oral airway was not used in either group.

Table 4. Number of patients with airway related adverse events at Minilik II Referral Hospital and Saint Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia, from January 2022 to April 2023 G.C

	Propofol with inhalational group	Inhalational alone group	P value
Laryngospasm	0	4 (7.3%)	0.042*
Coughing	2 (3.6%)	15 (27.3%)	0.001*
Breath holding	8 (14.5%)	6 (10.9%)	0.567
Jaw thrust/ chin lift applied (airway 0bstruction)	18 (37.2%)	8 (14.5%)	0.025*
Oral airway used	0	0	-
Suction after LMA removal	4 (7.3%)	8 (14.5%)	0.221
Retching	0	0	-
Vomiting	0	0	-

NB. Chi square test was used to analyze variables; p-value <0.05 considered statistically significant.

5.4. Hemodynamic parameters

Heaomodynamic parameters, heart rate mean arterian pressure and oxygen saturation measured and recorded continuously at different time intervals, from inhalational discontinuation time up until 20 min.

HR and MAP score were recorded before inhalational discontinuation, immediately after LMA removal, 5min after LMA removal, 10min after LMA removal, 15min after LMA removal and 20min after LMA removal. HR and MAP scores of patients in each group is shown in **Table 5.**

Table 6. The median HR and MAP at different time interval between group P & group I at Minilik II Referral Hospital and Saint Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia, from January 2022 to April 2023 G.C

		Propofol with inhalational group	Inhalational alone group	P value
Median HR score(beat /min)	Before inhalational discontinuation	136	135	0.957
	Immediately after LMA removal	133	132	0.957
	5min after LMA removal	126	128	0.506
	10min after LMA removal	128	128	0.746
	15min after LMA removal	125	125	0.808
	20min after LMA removal	123	127	0.497
Median MAP score (mmHg)	Before inhalational discontinuation	66	65	0.337
	Immediately after LMA removal	63	63	0.561
	5min after LMA removal	68	67	0.659
	10min after LMA removal	68	68	0.997
	15min after LMA removal	66	68	0.883
	20min after LMA removal	67	65	0.489

NB: an independent student T-test was used to analyze variables

Median SpO_2 score were recorded before inhalational discontinuation, immediately after LMA removal, 5min after LMA removal, 10min after LMA removal, 15min after LMA removal and 20min after LMA removal. SpO_2 scores of patients in each group is shown in **Table 7.**

Table 8. the median SpO2 at different time interval between group P & group I at Minilik II Referral Hospital and Saint Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia, from January 2022 to April 2023 G.C

		Propofol with inhalational group	Inhalational alone group	P value
Median SpO_2 score (%)	Before inhalational discontinuation	99	99	0.063
	Immediately after LMA removal	97	97	0.693
	5min after LMA removal	97	97	0.053
	10min after LMA removal	98	97	0.446
	15min after LMA removal	99	98	0.488
	20min after LMA removal	99	98	0.057

5.5. Comparison of emergence duration

Emergence duration was measured from inhalational discontinuation up to first cry. A chi-square test showed a comparable emergence duration between the two groups there $p>0.05$.

Table 9. Comparison of emergence duration between group P & group I at Minilik II Referral Hospital and Saint Paul Hospital Millennium Medical College, Addis Ababa, Ethiopia, from January 2022 to April 2023 G.C

	Group P	Group I	P value
<20 minuets	49 (89.1%)	45 (81.8%)	0.279
>20 minuets	7 (10.9%)	10(18.2%)	

NB: Group P Propofol with inhalational group, Group I inhalational alone group

Chapter Six: Discussion

The focus of this study was to explore a safe method for LMA removal following ophthalmic surgery, by overcoming common challenges like airway related adverse events, hemodynamic changes and emergence duration; We compared the efficacy of Propofol versus inhalational anesthetics for deep LMA removal.

In the presented study, we found a high incidence of airway related adverse events following LMA removal in inhalational alone group (58.2%) than Propofol with inhalational group (38.2%). A serious adverse event, larengeospasm, occurred not frequently. In the study four patients in inhalational groups developed larengeospasm, which was managed by administering manual positive pressure ventilation with 100% oxygen using a facemask. The most common adverse event noted in the study was airway obstruction 8 patients in group P and 18 patients in group I, patients was managed by applying jaw thrust and\or chin lift. This high incidence of adverse events can be attributed to the involvement of many anesthetists with different year of experience and lack of a well-established guideline for anesthetic management of these patients at study hospitals.

Our study showed a statistically significant difference in the incidence of airway related adverse events between group P (38.2%) and group I (58.2%), ($p< 0.05$). Our result is comparable with a randomized control trial done in Pakistan, 2019, by Kumar, Dileep et al. the study concluded that low-dose Propofol (1mg/kg) administered before LMA removal in pediatrics patients was associated with lower incidence of adverse airway events ($p< 0.05$) than removal under deep anesthetic technique with inhalational anesthetic in pediatric patients. (14)

However, we found a higher incidence of airway related adverse events following LMA removal in inhalational alone group (58.2%) compared to a cohort study done in Ethiopia, 2017 on pediatrics patients undergoing ophthalmic surgery in the study Hika et al. reported the overall incidence of airway complications following deep LMA removal with inhalational anesthetics to be 48.4%. (10) This difference may be due to usage of other inhalational anesthetic agent (halothane) along with isoflurane in their study; our study includes only isoflurane.

The current study finding showed that, the incidence of airway obstruction 18(37.2%) versus 8(14.5%) in group P versus group I respectively ($p< 0.05$). In line with our study Kumar, Dileep et al. 2019, Pakistan, in their study involving 50 pediatric patients, they reported higher incidence of airway obstruction in Propofol group 9(36%) versus 3(12%) in inhalational group ($p< 0.05$). (14)

In this study Coughing was found in 2(3.6%) Propofol with inhalational group and 15(27.3%) inhalational alone group. Laryngospasm was observed only within inhalational alone group in 4(7.3%) patients versus 0 patients in Propofol with inhalational group. Both coughing and laryngospasm showed a statically significant difference in between the two groups ($p< 0.05$). In agreement to our finding, a RCT study by Pak, Hae Jin, et al. 2010, Korea, reported a significant difference in the incidence of coughing between Propofol and control groups.

Although Kumar, Dileep et al. found higher incidence of coughing and laryngospasm within inhalational group, in contrary to our study the difference in between the groups did not reach statistical significance in their study. (14) This difference may be due to the small sample size they used in their study.

We found a lower incidence of excessive salvation 4(7.3%) patients in Propfol within inhalational group than 8 (14.5%) in inhalational alone group. The difference in between the groups did not reach statistical significance ($p> 0.05$), in line to our study. Kumar, Dileep et al. also reported no statistically significant difference in the incidence of Hyper-salvation between inhalational and Propfol groups ($p> 0.05$). (14) in contrast, Hika et al. reported a lower incidence of excessive salivation (12.9%) following deep LMA removal with inhalational anesthetics than in our study.(10) This difference can be attributed to the use of ketamine in addition to Propofol as an induction agent in our study.

The current study showed no statistically significant difference in incidence of Breath holding 8(14.5%) Propfol within inhalational 6 (10.9%) inhalational alone groups ($p> 0.05$). In contrary to our result an RCT by Kaur s et al. India, 2006, including pediatric patients undergoing oral surgery reported significant difference in the incidence of breath holding between 12(48%)

patients in control group versus 3(12%) in Propofol group ($p< 0.05$). (32) The increase incidence can be assumed to be due to the different type of surgical procedures the studies included.

In this study, no statistically significant difference in hemodynamic parameters was noted. HR, MAP and SpO2 scores were comparable before inhalational discontinuation, immediately after LMA removal, 5min and 10min, 15min and 20min after LMA removal in both groups ($p> 0.05$). Consistent to our result a cohort study done on the effect of a sub hypnotic dose of propofol (0.5mg/kg) for the prevention of laryngeospasm in pediatric patients; Ethiopia, 2020, by Gebeyehu G, et al. reported no significant difference in HR and MAP between the two groups immediately after extubation, 5min and 10min after extubation ($p< 0.05$); between propofol and non propofol group. However, they found the median SpO2 score were lower in non propofol group at the end of surgery, immediately after extubation, 5 min after extubation and 10 min after extubation ($p<0.05$).(19) This difference can be attributed to the high incidence of laryngospasm reported in their study, which is a major cause of fall in SpO2 score.

In the study we also assessed the emergence time between the two groups, we found a slightly increased incidence of delayed emergence in inhalational group 10(18.2%) versus propofol group 6(10.9%) ($p> 0.05$). In line with our result a study by Kaur s et al. India, 2006, done to assess role of Propofol in prevention of extubation related complications reported a higher incidence of delayed recovery in control group 8(32%) patients compared to 1 (4%) patient in Propofol group.(29)

In contrast the current study Kumar, Dileep et al. reported a statistically significant difference in emergence time ($p<0.05$) in between Propofol and inhalational groups; emergence time was shorter in Propofol group (14). This difference may be due to higher inhalational MAC for anesthesia maintenance we used in our study.

Chapter Seven: Strength and Limitations of the study

7.1. Strength

Having no incompiete data with missing values and homogeneity of study participants between the groups were the strengths of the current study.

7.2. Limitation

The main limitation is that the study included only ophthalmic procedures.

The study being observational we were unable to recommend a single most effective dose of Propofol

Due to lack of prior studies on the topic most studies we reviewed were randomized control trials on related topics.

Chapter Eight: Conclusion and Recommendations

8.1. Conclusion

Based on our findings we conclude that Small dose Propfol (0.5-1mg/kg) administered before LMA removal prevents airway adverse events without causing hemodynamic changes or delaying emergence duration following LMA removal in pediatric ophthalmic patients.

5.6. Recommendations

Based on the findings of this study we drawn the following recommendations.

- We recommend usage of small dose (0.5-1mg/kg) Propofol one minute before LMA removal to prevent airway related adverse events.
- We also recommend further randomized control trials in order to adapt this protocol in to our routine practice and avoid bias in the use of small dose (0.5-1mg/kg) propofol one minute before LMA removal to prevent adverse events.

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Annexes

Annex I: English Version Oral Consent

Hello my name is_____. I am master's student in anesthesia from Addis Ababa University.

We are doing study on a drug called Propofol. I am going to give you information and invite your child to be part of this research. You do not have to decide today whether or not your child will be involved in the research. Before you decide, you can talk to anyone you feel comfortable with about the research. There may be some words that you do not understand. Please ask me to stop as we go through the information and I will take time to explain.

Propofol is an ordinary drug, it is mostly used as an induction drug to put patients to sleep at the beginning of surgery. It is also use at the end of surgery to avoid emergence complications. On the other hand LMA is inserted into a patient's airway after he/she is put to sleep. It provides as a channel through which the patient breaths oxygen and inhalational anesthetics. Its removal is associated with unwanted airway related events.The reason we are doing this study is to assess how effective propofol is in preventing airway related adverse events following LMA removal.

The hospital anesthetists will insert the LMA into your child's airway as usual, and provide the regular management. At the end of surgery, they will administer Propofol before removing the LMA. This is the routine practice of the hospital. We will not do anything other than observing, and recording airway related adverse events that follow the LMA removal. Your child's involvement in the study will be voluntary, and you may decide to withdraw him/her from the study at any time without any penalty. The study will be conducted with the approval of Addis Ababa University ethical committee. Your child identity will be protected with utmost confidentiality during the study. Now I would like to ask you if you agree to let your child involved in this study. Do you agree?

Annex II: Amharic Version Oral Consent

ጤናይስጥልኝ …….እባላለው።በአዲስአበባዩኒቨሪስቲየሁለተኛድግርየአንስቴዝያተማሪነኝ።
”propofol”
በሚባልየአንስቴቲያመድሀኒትላይጥናትእያደረኩነው።አሁንበምነግሮትመረጃመሰረትልጆበጥናቱአንዲካተ
ትእጋብዛለው።ፍቃደኝነቶንዛሬማሳወቅአይጠበቅቦትም።ከመወሰኖበፊትየፈለጉትንሰውስለጥናቱመጠየቅ
ይችላሉ።አሁንስለጥናቱገለጻበማደርግሎትግዜያልገባዎትነገርካለአሰቁመዉኝመጠየቅይቸላሉ።
“Propofol”
በቀዶጥገናመጀመሪያላይታካሚዎችንለማስተኛትየሚሰጥየተለመደመድሀኒትነው።እንዲሁምበቀዶጥገና
ውጣብቂያላይከሰመመንበመንቃትጊዜየሚፈጠሩተጓዳኝችግሮችንለመከላከልይሰጣል።በሌላበኩል"Laren
geal mask airway
(LMA)"ታካሚዎችእንቅልፍላይከተደረጉበሗላበታካሚዎችየአየርቱቦውስጥየሚገባአክስጅንናየሚሰቡየማ
ደንዘዣአይነቶችወደሰውነትውስጥእንዲገቡየሚያደርግመሳሪያነው።ምንምእንኳበቀላሉየሚቀረፉቢሆንም
ይህየአየርቱቦበሚወጣበትግዜየጎንዮሽጉዳትምያደርሳል።እኛምይህንጥናትየምናካሂድበትምክንያት"Propof
ol"የተባለውመድሀኒትእነዚህንየጎንዮሽጉዳቶችንለመከላከልውጤታማነቱንለመመዘንነው።የሆስፒታሉአንስ
ቴቲስቶችለሁሉምታካሚዎችእንደሚደርጉትይህንቱቦየልጆትየአየርቱቦውስጥበማስገባትለልጆየሚያስፈልገ
ውንተገቢውንአገልግሎትያደርጉለታል።ቀዶጥገናውምሲያልቅአንስቴቲስቶችየአየርቱቦውንከማውጣታቸው
በፊት"Propofol"የተባለውንመድሀኒትይሰጣሉ።ይህምየሆስፒታሉአንስቴቲስቶችለሁሉምታካሚዎችየሚያ
ደርጉትመደበኛአገልግሎትነው።የኛሚናቱቦውበሚወጣበትግዜየሚያደርሰውንተያያዥጉዳትመመልከትናመ
መዝገብብቻነው።ልጆትበጥናቱውስጥየሚካተተውበእርሶፍቃደኝነትሲሆንበማንኛውምሰአትልጆትበጥናቱ
እንዳይካተትማለትይችላሉ።ይህንበማድረጎምየሚደርስቦትቅጣትሆነከልጆየሚጓደልበትአገልግሎትአይኖር
ም።ይህጥናትየሚካሄደውከአዲስአበባዩኒቨሪስቲየስነምግባርኮሚቴይሁንታንአግኝቶነው።በጥናቱግዜየልጆ
ትማንነትበሚስጥርይያዛል።አሁንልጆበጥናቱእንዲካተትፍቃደኝነቶንጠይቃለው።ፍቃደኛኖት?

Annex III: Questionnaire

Questionnaire prepared to collect demographic data, and perioperative anesthetic management information.
Date: _____

Card no _____

Section I: Socio Demographic Data and Question related to anesthetic interventions

Demographic Data	
Age (Years)	
Weight (Kg)	
Sex	A)Male B)Female
ASA	A)ASA I B) ASA II
Perioperative Anesthetic Management	
Premedication **(dosage & route)**	A) Atropine Dose …….. B) Lidocaine Dose …….. C) Dexamethasone Dose …… D) Hydrocortisone Dose……..
Induction **(dosage & route)**	**A) Propofol Dose ……..** **B) Ketamin Dose ……..** **C) Ketofol Dose ……..** **D) Thiopentone Dose ……..** **E) Other**
Maintenance **(dosage or MAC** **& route)**	A) TIVA B) Halothane C) Isoflorane **D)** Other

Additional drugs given intraoperatively other than the maintenance (drug type, dosage & route)	Drug …… Dose …….
LMA Size	**A) 1** **B) $1\frac{1}{2}$** **C) 2** **D) $2\frac{1}{2}$** **E) 3**
Number of Attempts atLMA Insertion	
Associated Problemson LMA Insertion	
Anesthesia time (Duration)	
Surgery time (Duration)	
Was Propofol administered	A) Yes B) No
Propofol dose	
Inhalational MAC before discontinuation	

Section II. Airway Adverse Events

Airway Related AdverseEvents From Time Of Inhalational Discontinuation Up To 20 Minutes Following LMARemoval	
Laryngospasm	**A) Yes** **B) No**
Coughing	**A. Yes** **B. No**
Breath holding	**A) Yes** **B) No**
Jaw thrust/ chin lift applied	**A. Yes** **B. No**
Oral airway used	**A. Yes** **B. No**
LMA biting	**C) Yes** **D) No**
Suction after LMA removal	**A) Yes** **B) No**
Retching	**A) Yes** **B) No**
Vomiting	**C) Yes** **D) No**

Section III: Emergence duration

Time duration from discontinuation of anesthetic agent to crying	**A. < 20 min** **B. > 20 min**

Section IV: Vital sign changes in HR, MAP and SpO_2

Time	Hemodynamic changes		
	HR(beats/min)	**MAP(mm hg)**	**Spo2**
Before inhalational discontinuation			
After Propofol administration			
Immediately after LMA removal			
5 min after LMA removal			
10 min after LMA removal			
15 min after LMA removal			
20 min after LMA removal			

Name of data collector _____

Signature _____

Thank you!!!