Research Article

Ketofol versus propofol on laryngeal mask airway insertion conditions in pediatrics

Amany K. Abu Elhassan, Wegdan A. Ali and Marwa M. Fahmy
Department of Anesthesiology and Intensive Care, El-Minya Faculty of Medicine.

Abstract
Objective : To comparatively evaluate the conditions for laryngeal mask airway insertion using ketamine with propofol VS propofol alone in children **Background**: LMA is one of the most important airway devices in the modern anesthesia and a number of induction agents and adjuncts have been tried to facilitate smooth insertion of LMA. **Methods:** A total of 100 children, ASA grade I and II, aged 3-12 years of both sexes, scheduled to undergo short elective surgeries under general anesthesia were included in the study, they devided into two groups 50 patients each: Group I (P): received 5 ml normal saline, followed by propofol 3.5 mg/kg IV and Group II (PK): received ketamine 0.5 mg/kg, diluted with NS to a total volume of 5 ml, followed by propofol 3 mg/kg IV. **Results**: MAP and HR decreased significantly in groups P compared to baseline values throughout the study period (post induction, at 1, 3, 5 and 10 minutes after LMA insertion).while Group PK showed significant increase in HR and blood pressure shortly after induction .The incidence of complete jaw relaxation and full mouth opening was significantly higher in groups PK (80% of patients respectively) as compared to group P (40%, P <0.001) and LMA insertion was easy in most of the patients in groups PK (18 out of 20) when compared to group P (12/20).The incidence of swallowing, coughing/ gagging, and head/limb movements was more in the propofol group. **Conclusions**: Ketofol is preferred than propofol alone in maintaining hemodynamic stability and better LMA insertion conditions.
Key words: propofol, Ketofol, ketamine, hemodynamic stability

Introduction
The insertion of LMA requires sufficient depth of anesthesia for the jaw muscles to relax and the inserted LMA to be tolerated without undue coughing, gagging, breath holding and patient movement (Brimacombe and Berry, 1996). Propofol is the preferred induction agent for Laryngeal mask airway (LMA) insertion which is widely used for providing general anesthesia in children (White, 1988). It allows easy insertion of LMA by depressing airway reflexes. However, adverse effects include dose-dependent cardiorespiratory depression, injection pain and no analgesic properties (Arora, 2008).

The addition of adjuvants, such as midazolam, ketamine, low dose muscle relaxants, opioids and sevoflurane have been advocated to further improve the LMA insertion conditions (Chui and Cheam, 1998). Ketamine use as a single induction agent, however, is limited by emergence hallucinations, elevation of blood pressure and heart rate due to its sympathomimetic effects and increased intracranial pressure (Strayer and Nelson, 2008).

Patients and methods
With the approval of our University Ethical Committee, this randomized, prospective, double-blinded study was conducted in El-Minia University Hospital during the period from February 2016 to December 2016. A total of 100 children, ASA grade I and II, aged 3-12 years of both sexes, scheduled to undergo short elective surgeries under general anesthesia were included in the study. Patients with

suspected difficult airway, with increased risk of gastric regurge, with cardiac or pulmonary abnormalities, neuromuscular disease or with known allergy to any of the study drugs were excluded. After obtaining informed parental consent, patients were divided randomly into two groups, according to computer generated numbers, having 50 patients each: Group I (P): received 5 ml normal saline, followed by propofol 3.5 mg/kg IV and Group II (PK): received ketamine 0.5 mg/kg, diluted with NS to a total volume of 5 ml, followed by propofol 3 mg/kg IV.

After standard monitoring of ECG, SpO2, MAP and temperature, all patients were premedicated with atropine 0.01 mg/kg. The patients were preoxygenated for 3 minutes before induction of anesthesia. Anesthesia was induced with propofol, given over 15 seconds, 2 min. after the study drug. The induction agents were prepared and administered to the patients by an anesthetist not involved in the study. At 90 seconds after induction of anesthesia, insertion of the appropriate size LMA was performed, using the standard Brain method, by an experienced anesthetist who was blinded to the medications given. If the first attempt of LMA insertion was unsuccessful, the patient had a subsequent bolus dose of propofol 1 mg/kg and ventilated with face mask. A maximum of 3 attempts were allowed for insertion of the LMA and insertion condition assessment was done only for the first attempt. All patients were assessed with regards to: Hemodyanamic parameters: Heart rate (HR), mean blood pressure (MBP) and oxygen saturation (SpO_2) and all these parameters were monitored continuously and recorded at the following time intervals: baseline value, immediately after induction, 1 minute after LMA insertion and thereafter at 3, 5 and 10 minutes after LMA insertion. Also, we recorded the following measurements: LMA insertion conditions, Number of attempts of LMA insertion.

Results

This randomized, prospective, double-blinded study was conducted on 100 children scheduled to undergo short elective surgeries under general anesthesia. They were randomly divided into two equal groups fifty children per each group. According to the drugs used for induction of anesthesia. There were no statistically significant differences among the three groups with regard to age, weight and sex distribution.(Table:1)

Table (1): Demographic data:

variables	Group (P)	Group (PK)
Age (years)	8.7±3.9	8.9±3.5
Gender (male/female)	30/20	29/21
Weight (kg)	24.2± 6.5	22.4±7.4

MAP decreased significantly in groups P compared to baseline values throughout the study period (post induction, at 1, 3, 5 and 10 minutes after LMA insertion). Group PK showed significant increase in blood pressure shortly after induction. Regarding heart rate changes, group P showed significant decrease in HR compared to baseline values at all measurement points. In addition, After induction, HR was significantly higher in group PK than its value in group P. Concerning **the LMA insertion conditions**, the incidence of complete jaw relaxation and full mouth opening was significantly higher in groups PK (80% of patients respectively) as

compared to group P (40%, P <0.001) and LMA insertion was easy in most of the patients in groups PK (18 out of 20) when compared to group P (12/20). The incidence of swallowing, coughing /gagging, and head/limb movements was more in the propofol group. Partial laryngospasm occurred in two patients in group PK. LMA insertion score was significantly better in PK group (6.9± 0.94) than the summed score for group P (8.6±1.7).

Discussion

Various adjuvants such as ketamine, midazolam, low-dose muscle relaxants, opioids and sevoflurane have been coadministered with propofol to facilitate smooth LMA insertion, while using lower doses of propofol (Gupta et al., 2011). Our data demonstrated that MAP and HR decreased significantly in groups P compared to baseline values throughout the study period (post induction, at 1, 3, 5 and 10 minutes after LMA insertion). while Group PK showed significant increase in HR and blood pressure shortly after induction and this correlates with the observations of Goyagi et al.,. Who found a significant decrease in BP and HR from preinduction values, after propofol induction with 1.95–2.6 mg/kg and before insertion of LMA (Goyagi et al., 2003). Another study was conducted on 100 children who were randomly divided into 2 groups to have either IV fentanyl 2μg/kg or ketamine 0.5 mg/kg, before induction of anesthesia with propofol 3.5 mg/kg. The results showed that the HR, systolic, diastolic and mean arterial BP was consistently higher in the ketamine group (Singh et al., 2011). Concerning the LMA insertion conditions, our study has shown better overall LMA insertion conditions in groups PK compared to P group, this correlates also with the results of Goel et al.,.

Who confirmed more acceptable insertion conditions in PK and PM groups, compared to propofol alone group, with no significant difference between PK and PM groups (Goel et al., 2008). Begec et al., studied 80 children who received either alfentanil 20μg/kg or Ketamine 0.5 mg/kg before anesthetic induction and concluded that Ketamine propofol combination may be preferred for proseal LMA insertion in children (Begec et al., 2009)

Conclusions

From the present study we concluded that the addition of ketamine 0.5 mg/kg to propofol 3 mg/kg provides suitable insertion conditions of LMA in spontaneously breathing children with hemodynamic stability than Propofol alone (3.5 mg/kg).

References

1. Arora S. Combining ketamine and propofol (ketofol) for emergency department procedural sedation and analgesia: A review. West J Emerg Med 2008; 9:20-3.
2. Begec Z, Demirbilek S, Onal D, et al., Ketamine or alfentanil administration prior to propofol anesthesia: the effects on ProSeal laryngeal mask airway insertion conditions and hemodynamic changes in children. Anesthesia 2009; 64(3):282-6.
3. Brimacombe J, Berry A M. The laryngeal mask airway anatomical and physiological implications. Acta Anaesthesiol Scand 1996; 40: 201-209
4. Chui PT, Cheam EWS. The use of low dose mivacurium to facilitate insertion of laryngeal mask airway. Anaesthesia 1998; 53: 486-510
5. Goel S, Bhardwaj N, Jain K. Efficacy of ketamine and midazolam as co-induction agents with propofol for laryngeal mask insertion in children. Pediatric Anesthesia 2008; 18(7):628-34
6. Goyagi T, Tanaka M, Nishikawa T. Fentanyl decreases propofol requirement for laryngeal mask airway insertion. Acta Anaesthesiol Scand 2003; 47: 771-774.
7. Gupta A, Kaur S, Attri JP, Saini N. Comparative evaluation of

ketamine-propofol, fentanyl-propofol and butorphanol-propofol on haemodynamics and laryngeal mask airway insertion conditions. Journal of Anaesthesiology Clinical Pharmacology 2011; 27: 74-78.

8. Singh R, Arora M, Vajifdar H. Randomized Double-Blind Comparison of Ketamine-Propofol and Fentanyl-Propofol for the Insertion of Laryngeal Mask Airway in Children.J Anaesth Clin Pharmacol 2011; 27(1): 91-96
9. Strayer RJ, Nelson LS. Adverse events associated with ketamine for procedural sedation in adults. Am J. Emerg Med 2008; 26:985-1028
10. White PF. Clinical pharmacology of intravenous induction drugs. Int Anesthesiol Clin 1988; 26:98-104.