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COMPARATIVE EVALUATION OF KETAMINE-PROPOFOL AND FENTANYL-PROPOFOL FOR INSERTION OF LMA IN CHILDREN

Anaesthesiology

Dr Kusum Gupta Resident Doctor, Dept of Anaesthesia, IMS, BHU ,Varanasi, UP.

Dr Anil Kumar Paswan Professor, Dept of Anaesthesia, IMS, BHU ,Varanasi, UP.

Dr Ujjwal Sourav* Asst professor, Dept of com. medicine, Saraswathi Institute of medical Sciences, Hapur, UP. *Corresponding Author

ABSTRACT

Introduction: Inadequate depth of anaesthesia may provoke coughing, gagging and laryngospasm which may lead to adverse haemodynamic changes and increase incidence of regurgitation and aspiration.

Methodology: This is a Prospective, randomized, double blinded, comparative study conducted at Department of anaesthesia, IMS ,BHU during Oct 2019 to Feb 2020.60 patients were randomly divided into 2 group , 30 each. In Group PK-ketamine 0.5mg kg-1, in Group PF-fentanyl 2ug kg-1 was given intravenously immediately before induction with propofol 2.5 mg kg-1.

Results: The incidence of limb movements was less in Group Propofol +Fentanyl compared to Group Propofol+ Ketamine. Coughing or gagging was seen in 2.86% of both the groups. Resistance to insertion was showing more in Propofol + Ketamine group. The systolic blood pressure(SBP), diastolic blood pressure(DBP) and mean arterial pressure(MAP) were statistically more with Ketamine group than Fentanyl group.

Conclusions: co-induction with Fentanyl (2µg/kg) prior to Propofol (2.5 mg/kg) for insertion of Laryngeal Mask Airway in children provided better insertion conditions and minimal alteration in haemodynamic parameters than co-induction with Ketamine (0.5 mg/kg) and Propofol (2.5 mg/kg)

KEYWORDS

LMA, Fentanyl, Ketamine propofol

INTRODUCTION

Propofol is the preferred induction agent for Laryngeal mask airway (LMA) insertion which is widely used for providing general anesthesia in children. Propofol is a nonopioid, non-barbiturate, sedative-hypnotic agent with rapid induction and recovery times and antiemetic effects. It allows easy insertion of LMA by depressing airway reflexes. However, adverse effects include dose-dependent cardiorespiratory depression, injection pain,and having no analgesic properties.[1]

Inadequate depth of anaesthesia may provoke coughing, gagging and laryngospasm which may lead to adverse haemodynamic changes and increase incidence of regurgitation and aspiration. Therefore, the optimal condition for LMA insertion mandates a generous use of an anaesthetic agent for induction.

Propofol, when used alone often exceeds 2.5 mg kg-1 which causes cardiorespiratory depression.[2]

Ketamine and fentanyl is well known for its airway reflexes maintaining activity and sympathetic cardiorespiratory stimulant so as to causes little or no cardiorespiratory depression and unlike propofol has pain relieving properties.[3]

Here, we have done a comparative evaluation of the conditions for LMA insertion with Ketamine versus Fentanyl adding Propofol in spontaneously breathing person undergoing day care procedures.

SAMPLE SIZE CALCULATION

Sample size was determined based on the study "randomized double blind comparison of ketamine – propofol and fentanyl – propofol for the insertion of laryngeal mask airway in children.[4]

MATERIALS AND METHODS

After obtaining institutional ethics committee approval and informed parental consent, 60 children of ASA class I and II, of both sex, age ranging from 3 to 15 years and undergoing elective short surgical procedures under general anesthesia were included in the study. Children who were at risk of regurgitation, with known allergy to either agents, or with difficult airway were excluded. Children were randomly assigned to one of groups 30 patients each; FP group (fentanyl+propofol), KP group (ketamine+propofol). Randomization was by the envelope method and the investigator and observer were blinded. Upon arrival at the operating room, patients were preoxygenation with 100% oxygen for 3 minutes during which the standard monitors; electrocardiogram, noninvasive blood pressure and pulse oximetry were attached to the patient. One minute before induction, baseline readings were recorded. Providers were given one 20 ml syringe and one 10 ml syringe for rescue if needed. The clinician and observer were blinded to the medication and doses being administered during induction. The 20 ml syringe in both groups looked identical (appeared to be propofol only) but depending on the group they were randomized to, it represented either 2 microgram fentanyl and 2.5 mg/kg of propofol (FP group) or 0.5 mg/kg of ketamine and 2.5 mg/kg of propofol (KP group). The 10 ml rescue syringe, if used, (due to any patient responding to stimulus after induction) represented 1 mg/kg of propofol (P group) or 0.25 mg/kg of ketamine and 0.5 mg/kg of propofol (KP group). In all patients general anesthesia was induced using a syringe perfuser at a constant rate 250 ml/h and the response was titrated until the target level of BIS 40 was obtained, an appropriate size LMA was inserted by an experienced anesthetist who was unaware of which group the child was in. A maximum of three attempts were allowed for the insertion of the LMA and Assessments were done only for the first attempt. Patients were kept on spontaneous respiration/assisted ventilation and anesthesia was maintained with sevoflurane 1-2%.

The following parameters were observed

Heart rate(HR), Systolic blood pressure, Diastolic blood pressure, Mean blood pressure(MBP), Respiratory rate(RR) and Oxygen saturation(SpO2),and ECG were monitored continuously. After patient became conscious, he/she was shifted to the recovery room. Patients were observed till discharge for both intraoperative and postoperative complications like laryngospasm bronchospasm, blood staining of the device, stridor, hoarseness of voice or painful phonation

RESULTS

In our study mean age in the fentanyl+ propofol group was 5.36 yrs ,whereas 4.78 yrs in ketamine+ propofol group.

Table 1: Distribution of study subjects as per LMA Insertion Ease and attempts.

LMA insertion ease	Fentanyl + Propofol group N(%)	ketamine + Propofol Group N(%)
Satisfactory	26(86.67)	19(63.3)
Diffcult	4(13.33)	11(36.7)
Total	30(100)	30(100)
LMA insertion attempt	**Fentanyl + Propofol group**	**Ketamine+ Propofol Group**
One	28(93.33%)	25(83.33%)
Two	2(6.67%)	5(16.67%)
Total	30(100%)	30(100%)

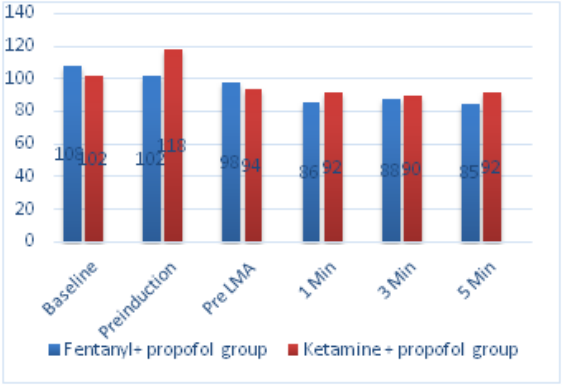
In Fentanyl group 86.67% study subjects had satisfactory LMA insertion ease whereas 63.3 % in ketamine group. In this study 93.33% study subjects had only one LMA insertion attempts in fentanyl group whereas 83.3% study subjects in ketamine group. Ease of insertion was assessed by the time taken to complete LMA insertion.

In this study 86.67% subjects had no LMA insertion problem in fentanyl group whereas in ketamine group only 60% had no insertion problem. 80% of study subjects had no complication in ketamine group whereas 90% of subjects were without complication in fentanyl group.

Table 2: Distribution of study subjects as per LMA insertion problems and complications

LMA Insertion Problems	Fentanyl+ Propofol Group	Ketamine + Propofol Group
Nil	26(86.67%)	18(60%)
Limb Movements	2(6.67%)	6(20%)
Resist to Insertion	1(3.33%)	5(16.67%)
Gagging	1(3.33%)	1(3.33%)
Total	30	30
Complications	**Ketamine + Propofol group**	**Fentanyl + Propofol Group**
Nil	24(80%)	27(90%)
Blood stain	2(6.67%)	1(3.33%)
cough	4(13.33%)	2(6.67%)
Total	30(100%)	30(100%)

Fig 1: Mean systolic blood pressure in two groups



DISCUSSION

Comparisons have been made between Propofol 2.5mg/kg with Fentanyl 2µg/kg and Propofol 2.5mg/kg with Ketamine 0.5mg/kg with reference to ideal LMA insertion conditions. In our study, the insertion conditions of LMA were observed on the basis of variables such as resistance to insertion, swallowing, coughing, gagging, limb movements and laryngospasm as proposed in Sivalingam et al[5] and Cheam et al[6] study.

In our study the patients showed 86.67 % satisfactory insertion condition with Fentanyl + Propofol group compared to Ketamine + Propofol with 63.3%. The frequent variable that we encountered was limb movements. The higher incidence limb movements in Group Propofol + Ketamine could be due to the combined effects of excitatory movements caused by Propofol and increased muscle tone caused by Ketamine. Also the incidence of limb movements in Group PF (6.67%) was less compared to Group Propofol + Ketamine (20%) which is significant. Ranju Singh et al[7], in their study also found that Limb/ head movements were observed in 64% patients in the fentanyl group and in 76% patients in the ketamine group.

The study done by Goh PK et al[8], showed greater occurrence of limb movement in Ketamine group(40%) than Fentanyl group (16%), the incidence was more than what we noted. This has been supported by the study done by Ranju Singh et al[7], which showed Group Propofol + Fentanyl had adequate (100%) jaw relaxation showing nil case of resistance to insertion with 14.29% resistance to insertion in Group Propofol + Ketamine of $p<0.0268$. Ghatak T et al[9], also compared the efficiency of Ketamine +Propofol, Fentanyl + Propofol or Saline + Propofol for hemodynamic features and insertion conditions for LMA in children premedicated with oral Clonidine. Ketamine and Fentanyl group showed a significantly better LMA insertion summed score and was similar in both the groups than saline group. Bah J et al[10], studied ideal insertion conditions with different doses of Propofol along with Ketamine + Lidocaine spray for inserting LMA. The study concluded that, dosage more than 3 mg/kg of Ketamine achieved satisfactory degree of jaw relaxation. Goh PK et al[8] in his study reported 23% of patients in Fentanyl group required additional bolus dose of Propofol compared to 10% of patients in Ketamine group. Our study showed only 8.5% of patients in Fentanyl group required additional bolus dose of Propofol with second attempt, compared to 17.1% of patients in Ketamine group. He has also reported that inserting LMA and resistance to mouth opening was found to be higher in Fentanyl group. The incidence of coughing/gagging between the two groups was not significant in our study. There was higher occurrence of coughing & gagging in KP Group (Ketamine-Propofol),of the study conducted by Gupta A et al[2], compared to Fentanyl-Propofol and Butorphanol-Propofol. The overall insertion ease was significantly good with Group PF compared to Group PK ($p=0.0007$).

Limitation of study: Sample size was very small , only one dose of ketamine ,propofol and fentanyl were evaluated .ketamine and its emergence reactions were not followed.

CONCLUSION

In this study, I conclude that co-induction with Fentanyl (2µg/kg) prior to Propofol (2.5 mg/kg) for insertion of Laryngeal Mask Airway in children provided better insertion conditions and minimal alteration in haemodynamic parameters than co-induction with Ketamine (0.5 mg/kg) and Propofol (2.5 mg/kg).

Statistical Analysis

Data was collected and assessed by Microsoft Excel , Open EPI and EPI Info 7.2 software. Appropriate statistical analysis were used.

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