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COMPARISON OF TWO DIFFERENT DOSES OF FENTANYL WITH STANDARD DOSE OF PROPOFOL FOR EASE OF LARYNGEAL MASK AIRWAY INSERTION IN CHILDREN

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ABSTRACT

Background: Laryngeal mask insertion in children is facilitated by addition of opioids with propofol.
Aim : To assess the dose of fentanyl needed for LMA insertion in children.
Materials & methods: A prospective , randomised , double blind study was conducted comparing two different doses of Fentanyl 1mcg/kg (Group 1 , n=30) and 2mcg/kg (Group 2, n= 30) with standard dose of propofol(2.5mg/kg) and midazolam(0.05mg/kg) to evaluate the ease of Laryngeal mask(classic) insertion in children aged between 3 and 12 years.The ease of insertion , with first time success rate and adverse responses were compared .
Results : Children receiving fentanyl 2 mcg/kg(group 2) had excellent conditions for LMA insertion with no adverse responses in 86.6 % (50% in group -1). The insertion was more successful in first attempt in group 2(93.3 % Vs 66.6% in group1).
Conclusion ; Fentanyl 2mcg/kg provides excellent conditions for laryngeal mask insertion with high success rate of insertion in first attempt with less adverse events.

KEYWORDS : Laryngeal Mask , Fentanyl, Ease Of Insertion, Propofol

INTRODUCTION :

The LMA has established role in routine pediatric anaesthesia1.For successful LMA insertion good induction agents like propofol 2, potent narcotics like fentanyl, alfentanil and anxiolytics like midazolam are necessary. The purpose of this study was to assess the LMA insertion conditions 3and hemodynamic changes comparing different doses of fentanyl with standard dose of propofol and midazolam.

MATERIALS AND METHODS

This was a prospective , randomised double blind study conducted during the year 2016-2017 in Mahatma Gandhi Memorial Govt Hospital , attached to KAPV Govt Medical College , Trichy.

After approval by the Institutional ethics committee 60 children of ASA status 1 belonging to both sexes, aged between 3 years and 12 years weighing between 10 and 30 kg scheduled for elective lower abdominal general surgical procedures were entered in this study. Children with history of asthma ,morbid obesity, difficult intubation score were excluded from the study.The selected children were randomised into two groups, group 1 and group 2 by sealed envelope technique.All children received Injection atropine in the dose 0f 20mcg/kg intramuscularly 45 minutes before induction.

On arrival in the operation theatre room, continuous recording of oxygen saturation and pulse by pulse oximeter was done.Intravenous access was established.Blood pressure was recorded manually.

After recording the base line values ,patients were pre-oxygenated with 100% oxygen for 3 minutes.Injection midazolam in the dose of 0.05 mg/kg was given intravenously.

These children were divided into two groups- Group 1 receiving Inj.fentanyl 1mcg/kg & Group 2 receiving 2 mcg/kg IV , followed by Injection propofol 2.5 mg/kg IV as an induction agent. Inj lidocaine was added to alleviate the pain of propofol injection, in a running drip to ensure stable levels in blood.Then mask ventilation was continued for 90 seconds for the peak action of propofol to occur ,to achieve adequate anaesthetic depth for insertion of LMA.

After 90 seconds ,Classic LMA of appropriate size 4(2-Wt.10-20 kg,2.5 –wt.20-30 kg) was inserted by theatre anaesthetist who was unaware of the doses of drugs given.The LMA was inserted by mid shaft technique . The person who inserted the LMA assessed the ease of LMA insertion.

Any adverse response like Inadequate jaw relaxation, gagging, coughing, limb or head movement, hiccoughs or laryngospasm were noted.

The response was graded as mild if the reaction was transient& minimal, moderate if the reaction lasted for few seconds to less than 20 seconds & severe if the reaction lasted for more than 20 seconds or needed additional induction agent to allow insertion (Injection propofol in the dose of 0.5 mg/kg was given in incremental doses).

The overall ease of insertion of LMA was graded as excellent if there is no adverse response, satisfactory if mild or moderate response not affecting LMA insertion or poor if there was severe response affecting LMA insertion.

After inserting the LMA ,the cuff was inflated with the prescribed volume of air 5 (10 ml -2 size ,upto 14 ml -2.5 size).Size 2 and 2.5 were used in the study.After confirming bilateral air entry , the LMA was secured with adhesive plasters.Anaesthesia was controlled by using non depolarising muscle relaxant Injection Atracurium 0.5 mg/kg IV and maintained with oxygen & nitrous oxide 50 % each.

Parameters observed were number of attempts in inserting the LMA, overall ease of LMA insertion ,pulse rate, systolic blood pressure and diastolic blood pressure , from which mean arterial pressure was calculated.

Pulse rate and blood pressure were noted before LMA insertion , at 1 minute and at 5 minutes.

Any movement of the patient and application of the surgical draping was avoided upto 5 minutes after inserting LMA.The study ended 5 minutes after inserting the LMA.

Results were expressed on mean & standard deviation.Statistical significance was determined by student's t test.

OBSERVATION AND RESULTS

The demographic data of the patients included in this study are shown in the following Table - 1.

	Group 1	Group 2	p value
Age	6.7 ± 3.1	6.5 ± 3.1	0.869
Weight	18.7 ± 5.8	17.3 ± 5.2	0.319

There was no significant difference between both the groups in terms of age and weight(p value 0.869 for age, p value 0.319 for weight).

	Group 1	Group 2	p value
Successful insertion in 1st attempt	20	28	0.042 significant
Insertion after additional bolus dose	10	2	

Table -2 shows the number of LMA insertions in first attempt and after additional bolus doses in both the groups.

Applying paired t – test showed a p value of 0.042 (< 0.05) which is

statistically significant.

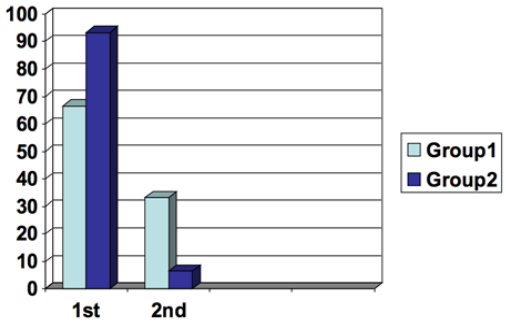

Figure 1 – Shows the overall ease of insertion of LMA in both the groups.

In group 1 excellent conditions of insertion were noted in 50 % of cases(15)while in group 2 excellent conditions occurred in 86.6 % of cases (26)P value of 0.008 (< 0.05)

which is statistically significant. The conditions for LMA insertion was poor in 33.3 % of cases (10) in group 1 and 6.6 % of cases in group 2, which is also very significant.

Table - 2 showing conditions for LMA insertion

GROUP	n	Excellent	Satisfactory	poor
1	30	15	5	10
2	30	26	2	2

Figure -2 showing overall ease of LMA insertion

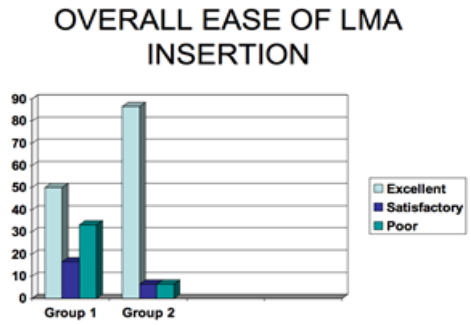

TABLE – 3 Showing the comparison between Groups 1 and 2 of pulse rate & Mean arterial pressure base line value , before LMA insertion, at 1 minute and at 5 minutes.

Events	Group 1	Group 2
Baseline pulse rate	95.23 ± 7.42	95.73 ± 8.06
Pulse rate before LMA insertion	86.53 ± 6.12	83.13 ±7.11
Pulse rate 1min after LMA insertion	88.41 ± 8.18	83.8±7.07
Pulse rate 5 min after LMA insertion	85.93 ± 6.35	83.6 ± 6.77
Base line BP	77.5 ± 7.21	76.79 ± 3.72
BP before LMA insertion	71.63 ± 7.05	66.99 ± 4.30
BP at 1 minute	75.63 ± 8.25	70.59 ± 6.66
BP at 5 minutes	74.14 ± 5.66	70.90 ± 4.92

There was significant difference in pulse rate & mean arterial pressure between groups 1 & 2 before LMA insertion and at 1 & 5 minutes. (p value <0.05)

DISCUSSION

The most common problems interfering with successful positioning of the LMA are Difficulty negotiating the posterior pharynx ,inadequate depth of anaesthesia, using the wrong sized LMA.

Successful LMA insertion requires adequate depression of upper airway reflexes which accompanies general anaesthesia.Coughing , gagging and limb movement can occur if LMA insertion is attempted in an inadequate plane or the dose of drugs given are not sufficient enough to suppress airway reflexes.Therefore it is prudent to select the dosage of drugs in such a way to suppress airway reflexes for easy insertion of LMA and also to avoid the harmful side effects of the drug.

Propofol is used for insertion of LMA as it has a depressant effect on airway reflexes.As propofol itself possesses no analgesic activity, additional analgesics are frequently administered during total i.v. anaesthesia with propofol.There are some reports that fentanyl reduce the 50% or median effective concentration (EC50) of propofol [6] used for various noxious stimuli.In our study we have compared the effectiveness of two doses of fentanyl 1mcg/kg and 2mcg/kg along with a standard dose of propofol(2.5 mg/kg)and midazolam (0.05mg/kg).

The adequate anaesthetic depth provided by GROUP 2 agents –fentanyl 2mcg/kg (propofol 2.5mg/kg and midazolam 0.05 mg/kg) facilitated easy insertion of LMA [7] with least adverse responses.High success rates in first attempt was obtained in 93.3 % of patients.All insertion attempts were done by the classical method with the cuff partially inflated as studies have shown a high success rate with this technique.

Although both methods of insertion(the classical and the partially inflated technique) were satisfactory, partial inflation of the LMA improved the ease of insertion in children as assessed by time to insertion and success rate on the first attempt. Inflation of the cuff of the smaller sized LMAs after insertion often displaces the LMA and alters its position while the inflated LMA tends to insert to the proper depth and requires no further adjustment_

The adverse response to LMA insertion like coughing ,gagging ,head and limb movement were considerably low in GROUP 2 which received fentanyl in a dose of 2mcg/ kg. This is due to effective attenuation of airway reflexes by this dose. This dose of fentanyl is also very safe as it resulted in no respiratory depression in the immediate post operative period and good awakening at the end of the surgery.Only 6.6% of the patients had severe adverse response to LMA insertion in GROUP2. preadministration of fentanyl 2 mcg/ kg decreases the propofol requirement for the LMA insertion [8].

Excellent insertion conditions with minimal adverse reactions were seen in the GROUP 2 which received fentanyl in dose of 2mcg/kg.Excellent conditions occurred in 86.6% in GROUP2 .Only 50 % of patients in GROUP1 (fentanyl 1mcg/kg) had excellent insertion conditions.This correlates with the study conducted by Dhamotharan, et al [9] which state that addition of either fentanyl 2 µg/kg or midazolam 0.05 mg/kg is an ideal adjuvant for LMA insertion with propofol 2.5 mg/kg.

Both the groups showed marked decrease in pulse rate and mean arterial pressure due to the synergistic action of the drugs on the hemodynamics. There was no marked rise in pulse or mean arterial pressure even after insertion of LMA in group 2 denoting the adequate depth of anaesthesia provided by the drugs.There was no marked fall in blood pressure necessitating the use of vasopressors or leading to cessation of drug administration.Thus the hemodynamic effects were clinically insignificant, much less than with tracheal intubation, comparable to the response recorded with the insertion of an oropharyngeal airway. This correlates with the study conducted by Mason ,Bingam et al (Anaesthesia1990).

CONCLUSION

To conclude, induction of anaesthesia with fentanyl 2mcg/kg, propofol 2.5 mg/kg and midazolam 0.05mg/kg provides excellent conditions for laryngeal mask insertions with high success rate of insertion in first attempt. It is also associated with least hemodynamic changes and adverse responses.

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