Comparison of Propofol Versus Propofol + Ketamine for LMA Insertion in Children undergoing Elective Eye Surgery

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[Received-17/09/2015, Accepted-26/09/2015, Published- 03/10/2015]

ABSTRACT:
Background: The major responsibility of an anaesthesiologist is to secure an unobstructed airway and provide adequate ventilation when general anaesthesia is administered. Supraglottic airway devices like Laryngeal Mask Airway (LMA) and cobra peri laryngeal airway are now considered as alternatives to endotracheal intubation for securing the airway and providing adequate ventilation even in difficult intubation and emergency situations. Aim of the study: To compare the efficacy and safety of Propofol induction Versus Propofol and analgesic dose of Ketamine for LMA insertion in children undergoing elective eye surgery. Materials and Methods: 50 patients of pediatric age group between 5 to 12 years belonging to ASA grade I scheduled for minor ophthalmic surgeries were randomised into two groups of 25 each. Group P was given Propofol IV and group PK was given Propofol and Ketamine IV. The insertion conditions of LMA, propofol requirement for induction, hemodynamic parameters and respiratory rate between the two groups were compared. Results: The study showed that the conditions for LMA insertion were better, hemodynamics were more stable and requirement of propofol was lesser in PK group (Stastically significant p<0.05). Conclusion: Ketamine in analgesic dose combined with propofol for LMA insertion in children undergoing elective eye surgery is better than propofol alone in aspects of decreased requirement of propofol for induction, ease of LMA insertion, better hemodynamic stability and better maintenance of respiratory rate.

Keywords: LMA insertion, Pediatric, Propofol, Propofol + Ketamine, hemodynamics

INTRODUCTION:
The major responsibility of an anaesthesiologist is management of airway so as to provide adequate ventilation to the patient by securing an unobstructed airway when general anesthesia is administered. As such, no anesthesia is safe unless diligent efforts are devoted to maintain an intact functional airway. Supraglottic airway devices like Laryngeal Mask Airway (LMA) and cobra peri laryngeal airway are now considered as alternatives to endotracheal intubation for securing the airway and providing adequate ventilation even in difficult intubation and emergency situations. LMA was designed by Dr A.I.J Brain in the year 1981 and introduced into clinical practice in 1987. Brain AIJ put forth “The Laryngeal Mask Airway, a new concept in airway management and described as a new type of airway, which he said, could be used as an alternative to either
the endotracheal tube or the face mask with either spontaneous or positive pressure ventilation. Brain in his pilot study of preliminary nature on 23 patients worked on the possible merits and demerits of the device.

Pennant JH and White PF in 1993, put forth “The Laryngeal mask airway”, its uses in anaesthesiology and described that laryngeal mask airway is a novel device that fills the gap in airway management between endotracheal intubation and use of the face mask. It is relatively simple to insert and may have a useful role in management of the difficult or failed intubations.\textsuperscript{13} LMA has many advantages over endotracheal intubation.

1. Avoidance of laryngoscopy.
2. Ease of insertion, (can be practiced by paramedics too).
3. Minimal pressor responses to insertion and removal.
5. Trauma, \textit{viz}: arytenoid dislocations, minor abrasions, epiglottis

Propofol (2, 6 diisopropyl phenol) is primarily a hypnotic and in sub hypnotic doses produce sedation and analgesia. Its advantages are rapid onset and easy titration of effect. It causes suppression of airway reflexes and has mild anti emetic effect. But it has a narrow therapeutic range and risk of cardiovascular and respiratory depression.

Ketamine, a phencyclidine derivative, NMDA receptor blocker is a hypnotic agent with analgesic properties and causes dissociative anesthesia. It is unique in that it is a cardiovascular and respiratory stimulant.

Addition of analgesic doses of ketamine to propofol lowers the dose of propofol, provides better intubating conditions and overcomes the risk of adverse effects.

**AIM OF THE STUDY:**
To compare the efficacy and safety of Propofol induction Versus Propofol and analgesic dose Ketamine for LMA insertion in children undergoing elective eye surgery.

**MATERIALS AND METHODS:**
After obtaining Institutional Ethical Committee clearance and informed parental consent, the study was carried out on 50 patients of ASA grade I at Sarojini Devi Eye Hospital, Mehdipatnam, Hyderabad.

The study was designed to compare the insertion conditions of LMA, propofol requirement for induction, hemodynamic parameters and respiratory rate between the two groups.

**Patient selection and Pre-Anesthetic Evaluation**
50 patients of pediatric age group between 5 to 12 years belonging to ASA grade I scheduled for minor ophthalmic surgeries.

**Inclusion criteria:**
1. ASA grade I
2. Age between 5 to 12 years of both sexes scheduled for elective eye surgeries like congenital cataract, examination under anesthesia, foreign body removals were included.
3. Duration of surgery between 10 to 25 minutes.

**Exclusion criteria:**
1. Open eye injuries
2. History of adverse reactions to ketamine
3. Duration of surgeries more than 30 minutes were excluded

A thorough preanesthetic evaluation was carried out in all the patients and procedure was explained in detail to all the patients.

Patients were allocated randomly into 2 groups of 25 each.

Group P who received propofol alone and group PK who received 0.5 mg/kg of Ketamine in addition to propofol.
All the patients were investigated preoperatively and following investigations were done.
1. Hemoglobin estimation
2. Urine examination: albumin, sugar and microscopic examination
3. Random blood sugar
4. Blood urea

**Conduct of Anaesthesia:**
After the patient is wheeled into the operation theatre, standard anesthetic monitoring was applied with noninvasive blood pressure, ECG, and pulse oximetry. After providing intravenous access, DNS solution started.

All patients were premedicated prior to surgery with Inj Glycopyrrolate 10 micrograms/kg

Inj Ketorolac 1mg/kg im was administered slowly in both the groups.

Patients were pre-oxygenated with 100% O₂ for 3 minutes. Just before propofol induction Inj Ketamine 0.5 mg/ kg was given in PK group only.

Patients are then slowly induced with incremental doses of propofol until there is loss of consciousness or loss of eye lash reflex. After loss of consciousness, LMA of appropriate size inserted. Cuff inflated with assigned amount of air and position confirmed by chest expansion.

If LMA insertion was unsuccessful for more than 3 attempts, the patient was withdrawn from the study.

After successful LMA insertion, anesthesia was maintained with sevoflurane 1.5%, 60% nitrous oxide, and 40% oxygen. If needed incremental doses of propofol were given for maintenance.

Following insertion of LMA, chest expansion and bag movements were observed to confirm proper placement of LMA.

Conditions of insertion of LMA were assessed using 6 variables: mouth opening (1 = full, 2 = partial, and 3 = nil), gagging or coughing (1 = nil, 2 = slight, and 3 = gross), swallowing (1 = nil, 2 = slight, and 3 = gross), head or limb movements (1 = nil, 2 = slight, and 3 = gross), laryngospasm (1 = nil, 2 = partial, and 3 = complete), and ease of LMA insertion (1 = easy, 2 = difficult, and 3 = impossible).

The insertion condition summed score (ICSS) for LMA insertion was calculated by summing the insertion score for each patient obtained from the variables mentioned above and then totalling the score for all patients in the groups and taking the mean.

Insertion time was recorded from the time of removal of the facemask to the first breath through the LMA. Propofol requirement for induction, mean arterial pressure (MAP), Heart Rate, and respiratory rate were measured before induction, immediately after induction; immediately after insertion of LMA and intraoperatively.

The incidence of adverse events during anaesthesia such as laryngospasm, bronchospasm, excessive secretions, hallucinations, bradycardia, muscular rigidity, nausea and vomiting were recorded.

**STATISTICAL ANALYSIS:**
All data were reported as mean values. Standard deviation calculated. Statistical analysis of the demographic data was done using *chi-square test*.

Statistical analysis between the groups was done using *student t-test* and compared along with the ‘*p*’ value for determination of statistical significance.

A *p* value of <0.05 was considered statistically significant.

**OBSERVATIONS AND RESULTS:**
Demographic variables:

<table>
<thead>
<tr>
<th>Age and Weight distribution:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group P</td>
</tr>
<tr>
<td>--------</td>
</tr>
<tr>
<td>Age</td>
</tr>
<tr>
<td>30</td>
</tr>
<tr>
<td>20</td>
</tr>
<tr>
<td>10</td>
</tr>
<tr>
<td>0</td>
</tr>
</tbody>
</table>

Pavani Kalyanam, et al.
The mean age in group P (8) is similar to that of PK group. The mean weight in both the groups, group P (22.92) and PK group (25) are almost equal. There is no statistically significant difference between the ages and weights in both the groups.

**Sex Distribution:**
There are equal number of male and female patients in the both the groups.

**Propofol requirement for induction:**

<table>
<thead>
<tr>
<th>Propofol Requirement for Induction in mg</th>
<th>Mean</th>
<th>SD</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group P</td>
<td>42.8</td>
<td>13.1209</td>
<td>0.0028</td>
</tr>
<tr>
<td>Group PK</td>
<td>35.2</td>
<td>9.43</td>
<td></td>
</tr>
</tbody>
</table>

The $p$ value was less than 0.05 and considered statistically significant. It was observed that in group PK where Ketamine was used before induction with propofol there was a significant decrease in requirement of propofol for loss of consciousness.

**Comparison of Insertion Conditions of LMA between the Two Groups:**

<table>
<thead>
<tr>
<th></th>
<th>Propofol group (p)</th>
<th>Propofol +Ketamine (PK)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attempts (n)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>23</td>
<td>24</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>3</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Mouth Opening</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full(1)</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td>Partial(2)</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Nil(3)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gagging or Coughing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nil</td>
<td>22</td>
<td>24</td>
</tr>
<tr>
<td>Slight</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Gross</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Swallowing</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nil</td>
<td>19</td>
<td>23</td>
</tr>
<tr>
<td>Slight</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Gross</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Movement</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nil</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Slight</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Gross</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Laryngospasm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nil</td>
<td>25</td>
<td>24</td>
</tr>
<tr>
<td>Partial</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Complete</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ease of LMA insertion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Easy</td>
<td>21</td>
<td>23</td>
</tr>
<tr>
<td>Difficult</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Impossible</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>LMA insertion Tim</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-20 seconds</td>
<td>4</td>
<td>23</td>
</tr>
</tbody>
</table>
Comparison of Propofol Versus Propofol + Ketamine for LMA Insertion in Children undergoing Elective Eye Surgery

<table>
<thead>
<tr>
<th>20-30 seconds</th>
<th>21</th>
<th>2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean time of insertion</td>
<td>20.72 sec</td>
<td>14.96</td>
</tr>
<tr>
<td>Insertion condition summed score</td>
<td>7.28(6-10)</td>
<td>6.36(6-10)</td>
</tr>
</tbody>
</table>

Number of attempts needed to insert LMA, successful insertions, and correct position of LMA was similar among both the groups. However, when considering the LMA insertion conditions summed scores and mean LMA insertion times, Group PK was favourable compared with Group P with better mouth opening, lesser gagging, coughing and minimal movements.

**Mean Arterial Pressure (MAP):**

Statistical analysis done by T-test

- T-values:
  - Pre-op: 0.098(<2.43) is insignificant
  - Immediately after Induction: 14.61(>2.43) is significant

<table>
<thead>
<tr>
<th></th>
<th>Group P</th>
<th>Group PK</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before Induction</td>
<td>74.4</td>
<td>72.4</td>
</tr>
<tr>
<td></td>
<td>4.30</td>
<td>4.08</td>
</tr>
<tr>
<td>Immediate after Induction</td>
<td>50.8</td>
<td>61.08</td>
</tr>
<tr>
<td></td>
<td>2.39</td>
<td>2.58</td>
</tr>
<tr>
<td>After LMA insertion</td>
<td>60.6</td>
<td>68.6</td>
</tr>
<tr>
<td></td>
<td>2.85</td>
<td>3.01</td>
</tr>
<tr>
<td>Intra op</td>
<td>55.5</td>
<td>63.28</td>
</tr>
<tr>
<td></td>
<td>2.4</td>
<td>2.93</td>
</tr>
</tbody>
</table>

Immediately after LMA insertion 10.30(>2.43) is significant

Intra op: 10.27(>2.43) is significant

P values

At all levels after induction were <0.001 and statistically significant

The mean arterial pressure difference between the groups is not significantly different before induction (T value =0.84; <2.43 is insignificant). So the T-test is applied to compare between the groups. The T value immediately after induction between the P and PK groups is 14.61 (>2.43) is significant. The T value after induction and insertion of LMA between the P and PK groups is 10.30 (>2.43) and is significant. The T value intra operatively is 10.27 (>2.43) is statistically significant.

There is a 31.72% decrease in P group immediately after induction when compared to a decrease of 17.90% in PK group. While after insertion of LMA there was a rise from mean arterial pressure after induction though it was not higher than MAP before induction in both the groups. A 26.61% reduction is observed intra operatively in the P group when compared to that of 14.946% in PK group compared to pre induction values.

Thus PK group was found to be more haemodynamically stable than P group immediately after induction, after LMA insertion and intra operatively.
Comparison of Propofol Versus Propofol + Ketamine for LMA Insertion in Children undergoing Elective Eye Surgery

**Heart Rate:**

<table>
<thead>
<tr>
<th></th>
<th>Group P</th>
<th>Group PK</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Just before induction (t0)</td>
<td>88.2</td>
<td>8.52</td>
<td>88.7</td>
</tr>
<tr>
<td>Immediately after induction (t1)</td>
<td>87.1</td>
<td>8.31</td>
<td>88.1</td>
</tr>
<tr>
<td>After insertion of LMA (t2)</td>
<td>91</td>
<td>8.80</td>
<td>91.1</td>
</tr>
<tr>
<td>Intra operative (t3)</td>
<td>86.8</td>
<td>8.61</td>
<td>87.1</td>
</tr>
</tbody>
</table>

Pre operatively there was no statistically significance difference (p value > 0.05) between the HR of both the groups hence t test was performed.

**T values:**

Pre induction was 0.20, after induction it was 0.42, after LMA insertion it was 0.30 and finally intra operatively was 0.12

These values were statistically insignificant.

The HR values were comparatively lower at all measurement intervals in both groups compared with the baseline values except after LMA insertion. There was no statistically significant difference in HR between Group P and Group PK at all intervals Hence it is apparent that heart rate was well maintained in both the groups with only slight increase during LMA insertion in both groups.

**Respiratory Rate:**

<table>
<thead>
<tr>
<th></th>
<th>Group P</th>
<th>Group PK</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
</tr>
<tr>
<td>Before Induction(t)</td>
<td>18</td>
<td>2.1</td>
<td>18.2</td>
</tr>
<tr>
<td>Immediate after Induction(t1)</td>
<td>17.08</td>
<td>2.5</td>
<td>17.78</td>
</tr>
<tr>
<td>After LMA insertion (t2)</td>
<td>17.92</td>
<td>2.1</td>
<td>18.30</td>
</tr>
<tr>
<td>Intra op (t3)</td>
<td>17.46</td>
<td>2.74</td>
<td>18</td>
</tr>
</tbody>
</table>

P values are greater than 0.05 hence insignificant.

Statistical analysis done by T-test

**T-values:**

Pre-induction 0.31 (<2.43) is insignificant
Immediately after Induction: 1.03(<2.43) is insignificant
Immediately after LMA insertion 0.67(<2.43) is insignificant
Intra op: 0.72(<2.43) is insignificant

The respiratory rate between the groups is not different significantly before induction. (P value is 0.75)(T value =0.31; <2.43 is insignificant). So the T- test is applied to compare between the groups. The T value immediately after induction between the P and PK groups is 1.03 (<2.43) is insignificant. The T value after induction and insertion of LMA between the P and PK groups is 0.67(<2.43) and is insignificant .The T value intra operatively is 0.72(<2.43) is statistically insignificant.

Though the respiratory rate is well maintained in both the groups at all levels of our study, in PK group the rate was better maintained and lesser decrease in respiratory rate was noted though not statistically significant.

**DISCUSSION:**

Pressor responses to endotracheal intubation have been studied from the past and have shown that epipharyngeal and laryngeal stimulation caused by laryngoscopy have led to transient significant increase in pressor response.
The use of laryngeal mask airway avoids the need for laryngoscopy resulting in less painful stimulation of the airway, and hence lesser degree of pressure response.

Recent advances in surgery and anesthesia have led to significant increase in the ambulatory surgeries. So effective analgesia with maintenance of good hemodynamics, which is vital in reducing the stay, is important. The basic idea of ambulatory surgery is to ambulate the patient as early as possible. The drugs which we administer play a major role.

Usage of drugs having prolonged duration of action, drugs which depress or activate the hemodynamics significantly, drugs which may cause post-operative nausea and vomiting especially should be judiciously used or better avoided if possible.

We have studied 50 of ASA grade I patients of pediatric age group between 5 to 12 years posted for minor elective ophthalmic surgeries, who were randomly allotted to two groups of 25 each.

The 2 groups were designated as group P (propofol) and group PK (propofol+ketamine).

In the present study, we compared the parameters of requirement of Propofol for induction, ease of insertion of LMA, hemodynamic stability and respiratory rate in both groups.

All the patients received premedication with inj. glycopyrollate and inj. Ketorolac im and pre-oxygenated with 100% O₂ for 3 minutes. Inj. Ketamine was given to group PK patients only at the rate of 0.5mg/kg body weight. Slowly induction was done with propofol until there was loss of consciousness. A well lubricated LMA of appropriate size was inserted. Cuff inflated and position confirmed.

Maintenance was with 1.5% sevoflurane, N₂O and O₂ in 3:2 ratio.

At the end of the operation, LMA was removed by deflating the cuff when patients were in deep anesthesia and had sufficient spontaneous respiration.

In our study the demographic data of patients age, sex and body weight were similar in the two groups.

**Propofol Requirement:**

In our study in PK group we observed a decrease in requirement of dosage of propofol for induction, which is statistically significant. Propofol is the best induction agent for ambulatory surgeries (6th Miller) mainly due to the rapid elimination of the drug, early recovery, decreased incidence of post-operative nausea and vomiting.

Okuyama, K., Inomata, S., Okubo, N., and Watanabe, 12 observed that. Pre treatment with small dose ketamine reduces predicted effect site concentration of propofol required for loss of consciousness and laryngeal mask airway insertion in women. They concluded in their studies that pretreatment with ketamine 0.2 mg/kg reduced the propofol concentration required for both LOC (22%) and LMA insertion (33%) in women.

Huiet al 11 studied “Additive interaction between propofol and ketamine when used for anesthesia induction in female patients”. Their study states that, effects of the combination of ketamine and propofol were additive at both hypnotic and anesthetic end points.

Erdoganet al 6 reported that ketamine + propofol provided LMA insertion conditions similar to those for propofol with a decreased propofol requirement for induction.

Frey K et al’s 7 “propofol versus propofol + ketamine sedation for retro bulbar nerve block: comparison of sedation quality, intraocular pressure changes, and recovery profiles” study states that ketamine supplemented to propofol provides faster and improved quality of sedation.

Dr Ravindra V Prasad et al15 from university of North Carolina did a study “ketamine and propofol in combination for sedation during laparoscopic tubal ligation compared to sedation with propofol alone”. They concluded that the combination of propofol and ketamine reduced propofol requirements as well as need for supplementation with N₂O.

**Ease of insertion of LMA:**

PK group had better conditions of insertion of LMA. The time of insertion of LMA was lesser.
in PK group. The insertion condition summed score was better in PK group. Propofol is an induction agent used frequently to insert LMA. Sufficient anesthetic depth and mouth openness is needed for correct insertion of supraglottic airway devices and prevent such complications as coughing, hiccups, swallowing, head and extremity movements and laryngospasm. When propofol is used alone it sometimes could not provide optimum LMA insertion conditions, or high-dose propofol is needed to improve the insertion conditions. On the other hand, high doses of propofol cause cardiorespiratory depression. Addition of ketamine, to propofol reduced the dose of propofol used and increased the success ratio of LMA insertion. This is substantiated by following studies

Gohet al9 reported success rate was 98.7% when ketamine was added to propofol. We found our LMA easy insertion success ratio to be 98% in Group PK. We think use of ketamine in Group PK was effective in this result. Addition of ketamine, to propofol increased the success ratio of LMA insertion in our study

Singh, R., Arora, M., and Vajifdar, H.16 in Randomized double-blind comparison of ketamine-propofol and fentanyl-propofol for the insertion of laryngeal mask airway in children concluded the combination of ketamine (0.5 mg kg-1) and propofol provides better conditions for LMA insertion in children than propofol and fentanyl

**Hemodynamic stability and Heart Rate:**
In our study, Mean Arterial Pressure and heart rate was compared at the following intervals
T 0 just before induction
T 1 immediately after induction
T2 immediately after LMA insertion
T 3 Intra operatively

MAP maintained a higher level in Group PK compared with Group P at all measurement times signifying the more hemodynamic stability with PK group.

The HR values were well maintained at all measurement intervals in both groups compared with the baseline values with a slight increase after LMA insertion in both groups .There was no statistically significant difference in HR between Group P and PK.

Ketamine increases heart rate and arterial blood pressure by activation of the sympathetic nervous system. Clinical effects of propofol and ketamine seem to be complementary. When propofol and ketamine are administered in combination, doses of both agents decrease and unwanted effects are minimized. It was shown in studies of adult and pediatric patients that ketamine applied before propofol induction for LMA insertion preserved hemodynamic stability. Similar results were shown in the following studies

Guit, J.B., Koning, H.M., Coster, M.L. et al.10 Ketamine as analgesic for total intravenous anaesthesia with propofol in their study observed that the propofol+ketamine combination resulted in haemodynamically stable anaesthesia.

Tosun et al17 reported that hemodynamic parameters were better maintained when 1 mg/kg ketamine was added to propofol for sedation in children with burns.

Likewise, in a study done by Erden et al5 propofol-fentanyl and propofol-ketamine combinations provided similar hemodynamic stability in children.

Dr. Barry L. Friedberg,3 in his 5 year review of 1254 cases concluded advantages for both anesthesiologists and surgeons of stable hemodynamics.

Furuya et al8 in their study “IV ketamine attenuates arterial pressure changes during induction of anesthesia with propofol” concluded that administration of ketamine before induction with propofol preserved hemodynamic stability compared with induction with propofol alone.

Tomatir et al17 in their study “effects of low dose ketamine before induction on propofol anesthesia for pediatric magnetic resonance imaging” concluded that IV low dose of ketamine before induction and maintenance with propofol preserves hemodynamic stability without changing the duration and quality of recovery compared to propofol alone.
**Respiratory Rate:**

In our study, respiratory rate was compared between two groups at different intervals

T0 just before induction
T1 immediately after induction
T2 immediately after LMA insertion
T3 Intra operatively

Not much difference was noted in both groups regarding respiratory rate at various intervals but respiratory rate was slightly better in PK group at all intervals though not statistically significant.

Following studies substantiate this.

Akin et al.\(^1\) showed that addition of ketamine to propofol protected respiration better than use of propofol alone for the purpose of sedation of children. Its depressive effect on the central respiratory system is minimal and it preserves response to carbon dioxide. In our study, respiratory rate preservation was better in PK group though not statistically significant.

J. Formos, Cheg KI et al.\(^4\) in their study “Anesthesia for pediatricchiromiropathy or hydroceleectomy: comparison of propofol / ketamine and thiopentone / halothane” concluded that propofol+ ketamine allows patients to maintain spontaneous natural airway breathing during anesthesia.

Rosendo F. Morteso et al.\(^14\)“The effects of small dose ketamine on propofol sedation : Respiration, post-operative mood, perception, cognition and pain” concluded that small dose ketamine attenuates propofol included hypoventilation, produces positive mood effects without perceptual changes after surgeries and may provide earlier recovery of cognition. Small dose ketamine during propofol sedation improves ventilation.

**SUMMARY AND CONCLUSIONS**

The present study is aimed at comparing the efficacy and safety of Propofol induction Versus Propofol and analgesic dose of Ketamine for LMA insertion in children undergoing elective eye Surgery Group P received only propofol, Group PK received ketamine (0.5mg/kg) in addition to propofol.

1. The conditions for insertion of LMA were much better with PK group as indicated by Insertion condition summed score
2. There was a decrease in propofol requirement for induction in PK group.
3. There was a more stable hemodynamic picture in PK group when compared to that of P group.
4. Respiratory rate was better in PK group and better maintained though statistically not significant
5. Post operatively all the patients reached an Aldrette score of 9 suggesting a good recovery.
6. Concerns regarding ketamine like increased secretion, delay of recovery and emergence of reactions were not witnessed in PK group in our study.

We conclude, by this study that ketamine in analgesic dose combined with propofol for LMA insertion in children undergoing elective eye surgery is better than propofol alone in aspects of decreased requirement of propofol for induction, ease of LMA insertion, better hemodynamic stability and better maintenance of respiratory rate.

**REFERENCES**

Comparison of Propofol Versus Propofol + Ketamine for LMA Insertion in Children undergoing Elective Eye Surgery

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