Comparative Study of Hemodynamic Changes During Induction and LMA Insertion: Propofol Versus Etomidate

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ABSTRACT

Introduction: Use of laryngeal mask airway (LMA) is increased in recent past as an alternative to the face mask and in some cases to the endotracheal tube. Study aimed to compare the effects of propofol and etomidate on hemodynamic parameters during induction and LMA insertion.

Material and Methods: For this prospective, randomized and controlled study 60 patients of both sex of ASA grade I and II, scheduled for elective surgery under general anaesthesia with LMA were enrolled and randomized into two groups. In group P, induction was done by propofol 2.5 mg/kg and in group E, induction was done by etomidate 0.3 mg/kg. Hemodynamic parameters were recorded at regular interval and adverse effects were noted down.

Result: Decrease in mean SBP, DBP and MAP were significantly more in propofol group while mean HR were comparable between the groups.

Conclusion: Etomidate is hemodynamically more stable compared to propofol.

Keywords: Etomidate, Propofol, LMA, Hemodynamic Change

INTRODUCTION

LMA is a supraglotic device which is placed without laryngoscopy. Muscle relaxant is not necessary for LMA insertion, but adequate mouth opening with suppressed airway reflex is required for smooth insertion.

Propofol (2,6-Diisopropyl phenol) is most commonly used inducing agent for LMA insertion as it provides satisfactory, rapid and smooth anaesthesia with quick recovery and reliable amenesia.[1] In dose range of 1-2.5 mg/kg propofol provides desired jaw relaxation with suppression of coughing and bucking reflexes after LMA insertion. But, it is also associated with side effects like hypotension, bradycardia, pain on injection and apnea.[2-4] Etomidate is also rapid onset short acting induction agent. It produces less cardiovascular depression than other other commonly used induction agents. Etomidate dose not depress airway reflex. Fentanyl, remifentanil and succinycholine improve the condition for LMA insertion. Side effects of etomidate are pain on injection, nausea, vomitting, myoclonus and adrenocortical suppression.

The aim of this study was to compare the effect of propofol and etomidate on heart rate and blood pressure during induction and after insertion of LMA. Pain on injection, myoclonus, apnea and ease of insertion of LMA was also compared. So that we can choose a safer inducing agent.

MATERIAL AND METHODS

After prior approval from institutional ethical committee, 60 patients of ASA grade I and II, between age 20-60 years of either sex, scheduled for elective surgeries under general anaesthesia with LMA were enrolled in this study. Exclusion criteria was patients with history of allergy to study drug, history of seizure disorder, gastroesophageal reflux disease, patients of steriod deficiency or on steroid medication, patients with pathology in larnyx or pharynx, mouth opening less than 2.5 cm, Mallampati grade 3 or 4. Patients were randomized by using closed envelop methods into two groups.

Group P (n=30): Received injection propofol (1%) (2.5 mg/kg)

Group E (n=30): Received injection etomidate (0.3 mg/kg)

Written informed consent was taken from all the patients. In all patients, induction of general anaesthesia and LMA insertion was done by senior anaesthesiologist, data was collected by another anaesthesiologist who was unaware of group allocation and study drug. Volume of study drug was made equal by diluting 10 ml of etomidate (2 mg/ml) with 10 ml of water in a 20 ml syringe and by filling 20 ml vial of propofol (10mg/ml) in seperate 20 ml syringe by third anaesthesiologist. The study was prospective, randomized, double blinded and controlled.

After shifting in operating room, intravenous line was secured with 18 G cannula and maltipara monitor was attached and base line value recorded. Prior to induction all patients were preloaded with 5ml/kg normal saline and premedicated with fentanyl 2mcg/kg I/V and midazolam 0.05 mg/kg I/V. All Patients were preoxygenated for 3 min with 100% oxygen and induced with either propofol or etomidate according to group allocation. Group P received propofol 2.5 mg/kg I/V and Group E received etomidate 0.3 mg /kg I/V. LMA was inserted 1 min after loss of conciousness and proper placement of the LMA was confirmed by chest expansion. Anaesthesia was maintained with O_2 and N_20 in 1:2 ratio and isoflurane 1-1.5% with spontaneous breathing on circle system. The hemodynamic parameters like heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP) and mean arterial pressure (MAP) were recorded before and after induction, before LMA insertion and after LMA insertion at 1, 3 and 5 minutes. Number of attempt and total time required for LMA insertion were recorded. Incidence of episode of apnea, pain on injection and myoclonus were also recorded.

STATISTICAL ANALYSIS

The statistical analysis was done by unpaired t test and chi-

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square test. Data was expressed as absolute number, percentage and mean ± S.D. P- value < 0.05 was considered significant.

RESULT

Demographic data (age, sex, weight and ASA grading) of the patients were comparable in both the study group (P>0.05). Base line of hemodynamic data (HR, SBP, DBP and MAP) were comparable in both the group and statistically insignificant (p>0.05).

Drop in SBP, DBP and MAP was seen on both the groups in all study timings but drop was significantly more in group P as compared with group E (Tables-1, 2, 3). Drop in HR was also noted in both the groups in all study timings but when group P was compared with group E, the change was statistically insignificant (p>0.05) (Table-4). Mean time taken for LMA insertion in group P and group E was 35.65± 2.8 seconds and 37.44± 2.4 seconds respectively (p<0.05).

In 27 patients of group P, LMA was inserted in first attempt while second attempt was needed in 3 patients for successful placement of LMA. In group E, LMA was successfully placed in first attempt in only 12 patients and second attempt was required in 18 patients. 43% of patients in group P and 10% of patients in group E complained pain on injection. In 33% of patients in group E myoclonus was noted but in group P Myoclonus was not seen in any patient. Apnea on induction was seen in 70% of patients in group P and 57% of patients in group E.

	Group P	Group E	P Value
Before Induction	125.8± 16.7	133.5±15.1	>0.05
After Induction	107.9± 18.4	124.7±13.8	<0.001
Before LMA Insertion	105.2±13.7	118.5±17.2	<0.001
After LMA Insertion			
1 Min	101.9± 11.6	117.3±14.1	<0.001
3 Min	101.2 ±12.4	116.1±14.6	<0.001
5 Min	100.6±11.3	116.5±12.7	<0.001

Table-1: Systolic Blood Pressure (SBP) (Mean ±SD)

	Group P	Group E	P Value
Before Induction	80.9±10.4	84.3±8.7	>0.05
After Induction	69.6±12.6	75.3±8.6	<0.05
Before LMA Insertion	66.8±13.6	74.5±9.9	<0.05
After LMA Insertion			
1 Min	63.5±11.7	71.3±10.3	<0.05
3 Min	62.1±10.8	70.1±11.5	<0.05
5 Min	62.9±11.4	70.3±12.1	<0.05

Table-2: Diastolic Blood Pressure (DBP) (Mean ± SD)

	Group P	Group E	P Value
Before Induction	95.1±10.8	93.3 ± 10.3	>0.05
After Induction	82.1 ±10.2	90.8 ± 9.1	< 0.001
Before LMA Insertion	77.5 ±9.1	87.4 ±12.7	<0.001
After LMA Insertion			
1 Min	76.7±12.5	84.8 ± 11.9	<0.05
3 Min	75.9±11.8	83.1 ± 9.8	<0.05
5 Min	75.3±11.5	82.5± 10.3	<0.05

Table-3: Mean Arterial Pressure (MAP) (Mean ± SD)

	Group P	Group E	P Value
Before Induction	81.5 ± 10.7	79.2 ± 12.7	>0.05
After Induction	75.7 ± 11.8	77.2 ± 10.7	> 0.05
Before LMA Insertion	71.5 ±9.5	74.2 ± 10.2	> 0.05
After LMA Insertion			
1 Min	72.2 ± 10.3	75.5 ± 11.4	> 0.05
3 Min	71.1 ± 9.3	74.1 ± 10.4	>0.05
5 Min	72.9 ± 10.7	75.1 ± 8.3	>0.05

Table-4: Heart Rate (HR) (Mean ± SD)

DISCUSSION

In our study, we found that there was significant decrease in mean SBP, DBP and MAP in propofol group in comparison to etomidate group. Uzun et al. compared propofol 2.5 mg/kg with remifentanil 0.05 mg/kg and etomidate 0.3 mg/kg with remifentanil 0.05mg/kg in LMA insertion and concluded that etomidate would provide better hemodynamic stability compared to etomidate.[5] Ghafoor et al. compared propofol 3 mg/kg with etomidate 0.3 mg/kg and found significant drop in SBP, DBP and MAP in propofol group and concluded that etomidate can prevent hypotension during induction but may delay LMA insertion.[6] Hosseinzadeh et al compared propofol, etomidate and propofol plus etomidate induction in LMA insertion and conclude that propofol plus etomidate combination is better than etomidate alone regarding number of attempt and insertion ease.[7]

In our study, change in mean HR was comparable between two groups. Ghafoor et al. also found that change in mean HR comparable between propofol and etomidate.[6] But Moffat et al. reported increase in HR with etomidate induction and in Shah et al. study propofol was associated with increase in HR.[8,9] Propofol in dose range of 2-3 mg/kg provides adequate jaw relaxation with attenuation of cough reflex, gag reflex and laryngospasm during LMA insertion but also associated with hypotension, bradycardia and prologed apnea.[10-12] Brown et al. compared propofol and thiopentone for LMA insertion and found favourable effect with combination of propofol 2.5 mg/kg and fentanyl (1 mcg/kg).[13] Liou et al. reported that LMA insertion was better with etomidate and fentanyl combination in comparison to etomidate alone.[14]

Incidence of pain on injection was found less with etomidate in study of saricaglu et al. and sowinski et al.[15,16] In our study, incidence of myoclonus was 33% in etomidate group and 0% in propofol group. Miner et al reported incidence of myoclonus 20% etomidate group and 1.8% in propofol group.[17] In Boysen et al. in study incidence of apnea was statistically insignificant between propofol and etomidate.[18]

CONCLUSION

We found that etomidate is associated with less hemodynamic changes during induction and LMA insertion but associated with myoclonus. Propofol is superior in LMA insertion ease. We conclude that etomidate would be better induction agent particularly in patients prone to hemodynamic changes.

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