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A COMPARATIVE STUDY OF EFFECT OF ETOMIDATE INDUCTION VS ETOMIDATE PLUS PROPOFOL INDUCTION ON HEMODYNAMIC RESPONSE TO ENDOTRACHEAL INTUBATION

Anaesthesiology

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ABSTRACT

Objective : Study aimed to compare the effects of etomidate and propofol plus etomidate on hemodynamic parameters during induction and endotracheal intubation in elective surgery.

Material and method: 40 patients aged 15 to 60 years of either sex and ASA physical status I or II scheduled for elective sx under G.A were studied. Patients were randomly placed into 2 groups. Group I induced with Inj. Etomidate (0.3 mg/kg) iv and Group II with Inj. Propofol (1 mg/kg) plus Inj. Etomidate (0.2 mg/kg) i.v. HR, SBP ,DBP, MAP and SPO2 were noted at different time interval.

Results: Baseline & pre-induction HR and MAP were comparable among groups with no statistical significant differences ($p>0.05$). Inter group comparison showed that there are significant differences ($p<0.05$) in heart rate among groups at time interval (after induction and 1, 2, 3 min after intubation). At 5min after intubation there are non significant differences among groups. At 1 min MAP was significantly stable ($p<0.05$) in group 2 after that there was no statistically significant difference.

Conclusion: The combination of etomidate & propofol has better hemodynamic stability than etomidate alone at 1 min after intubation, though etomidate was equally stable at other points of time.

KEYWORDS

Induction agents, intubation , haemodynamic changes

Endotracheal intubation is the gold standard and safest method for protecting the airway, delivering anesthetic gases and ensuring protection against aspiration. General anesthetic induction agents may decrease arterial blood pressure via myocardial depression, vasodilatation and attenuation of autonomic nervous activity

Direct laryngoscopy and passage of endotracheal tube are noxious stimuli that can provoke adverse responses in the cardiovascular , respiratory and other physiological system. The magnitude of the response is greater with increasing force and duration of laryngoscopy. An ideal intravenous (IV) anaesthetic agent should, have rapid onset, rapid recovery, be without undesirable cardiac and respiratory depression and lesser untoward effects like pain on injection, nausea, vomiting, etc.

The choice of an induction agent should be based on the adverse effect profile of the drug and clinical presentation of the patient. The elevation in arterial pressure typically starts within 5 secs of laryngoscopy, peak in 1 to 2 minutes and return to control levels within 5 min, there is a further increase in heart rate and blood pressure with passage of endotracheal tube. Hence our study was conducted with the intention of assessing 2 different approach of anesthesia induction (Inj. Etomidate and Inj. propofol plus Inj. Etomidate) by comparing certain parameters such as change in blood pressure and heart rate during induction and intubation as a primary outcome so as to found out an ideal induction agent having least hemodynamic alteration

Material and methods

After obtaining approval from ethical committee of Jhalawar Medical College and Hospital, and written informed consent from patients, We studied 40 patients of ASA grade I and II between 18 and 60 years of age of either sex, scheduled for elective procedure under general anesthesia with endotracheal intubation.The total 40 patients were randomly assigned into 2 groups of 20 patients randomly . Randomization was done by computer generated random number tables.

Group I (n = 20): received Inj. etomidate 0.3mg/kg of bodyweight)
Group II (n = 20) with Inj. Propofol (1 mg/kg) plus Inj. Etomidate (0.2 mg / kg) iv.

All patients were instructed to be nil per oral 8hrs before surgery . On arrival at operation theatre, patients were attached with standard anesthesia monitoring including Non-invasive blood pressure (NIBP), Pulse oximeter and baseline vital parameters were recorded. All patients were pre medicated and followed by an induction dose of either etomidate (0.3 mg/kg) or etomidate plus propofol (0.2 mg/kg IV. +1 mg/kg).Pain on injection and myoclonic movements were recorded, if any at induction .Duration of laryngoscopy was kept less than 30 seconds.

Endotracheal intubation was done and anesthesia was maintained by appropriate muscle relaxant and inhalational agent throughout the surgery.At the end of the surgery , patient was reversed, reversal was uneventful. Heart rate, systolic blood pressure, diastolic blood pressure and mean arterial blood pressure and oxygen saturation were continuously monitored and recorded before & after induction and at 1 minute, 2 minute, 3 minute, 5 minute after intubation

Exclusion criteria

1. Patient refusal.
2. ASA physical status III and IV
3. Emergency surgery.
4. Patients with multiple laryngoscopy attempts & duration more than 30 secs
5. Patients with cardiovascular diseases like ischemic heart disease or hypertension
6. Mallampati grade 3 and 4

Statistical analysis

The obtained data were analyzed using SPSS 16; descriptive data was compared and presented as Mean ± SD for continuous variables and as no and percentage for nominal variable

The various categorical and hemodynamic variables studied during observation period were compared using unpaired t test

The critical value of ' p ' indicating the probability of significant difference was taken as <0.05 for comparison. Baseline and pre-induction HR were comparable among both the groups with no statistical significant differences ($p>0.05$) Inter group comparison showed that there was significant differences ($p<0.05$) in heart rate among both groups at time interval (after induction and 1, 2, 3 min after intubation).

Table 1 : Group comparisons mean HR

Time interval	Group 1	Group 2	P value
Baseline HR	75.40 ± 6.678	92.50 ± 6.096	0.6433
HR pre induction	87.03 ± 6.776	86.03 ± 5.776	0.6184
HR after induction	87.27 ± 7.429	81.64 ± 6.780	**0.0167**
HR 1min after intubation	100.30 ± 5.726	92.50 ± 6.784	**0.0003**
HR 2mins after intubation	96.37 ± 6.031	91.17 ± 6.747	**0.0142**

HR 2mins after intubation	94.40 ± 5.852	90.17 ± 6.018	**0.0301**
HR 2mins after intubation	92.50 ± 6.096	89.83 ± 5.670	0.1597

Table 2 : Group comparisons mean SBP

Time interval	Group 1	Group 2	P value
Baseline SBP	125.83 ± 5.376	126.80 ± 7.208	0.6323
SBP pre induction	124.67 ± 5.839	125.97 ± 7.117	0.5315
SBP after induction	115.73 ± 5.605	114.40 ± 6.850	0.5056
SBP 1min after intubation	138.87±5.58	130.57 ± 4.826	**0.0015**
SBP 2mins after intubation	125.10 ± 3.536	124.97 ± 3.891	0.9125
SBP 2mins after intubation	123.30 ± 4.57	121.20 ± 3.995	0.1302
SBP 2mins after intubation	120.47 ± 5.468	118.50 ± 4.532	0.2224

Table 3:Group comparision of DBP

Time interval	Group 1	Group 2	P value
Baseline DBP	72.60 ± 4.852	73.23 ± 4.184	0.6626
DBP pre induction	70.16 ± 4.340	70.80 ± 5.499	0.6851
DBP post induction	66.00 ± 4.307	65.30 ± 5.338	0.6507
DBP 1 min after intubation	70.00 ± 4.299	74.13 ± 4.183	0.0038
DBP 2 min after intubation	72.00 ± 3.833	70.27 ± 3.805	0.1602
DBP 3 min after intubation	72.37 ± 3.023	71.43 ± 3.493	0.3685
DBP 5 min after intubation	70.43 ± 2.269	69.27 ± 4.093	0.2746

Table 4 : Group comparisons mean BP

Time interval	Group1	Group1	P value
Baseline Mean blood pressure	92.17 ± 4.379	91.73 ± 5.638	0.7843
Mean BP pre induction	88.57 ± 4.321	89.53 ± 5.686	0.5513
Mean BP post induction	84.57 ± 4.192	85.00 ± 5.425	0.7806
Mean BP 1 min after intubation	95.95 ± 4.082	92.77 ± 4.066	**0.0182**
Mean BP 2 min after intubation	91.70 ± 3.081	90.50 ± 3.555	0.2611
Mean BP 3 min after intubation	90.01 ± 2.484	89.35 ± 3.504	0.4961
Mean BP 5 min after intubation	88.44 ± 2.528	88.01 ± 3.830	0.6775

At 5min after intubation there was no difference among both the groups. Baseline and pre-induction SBP were comparable among both the groups with no statistical significant differences (p>0.05**). But SBP of two groups 1 min after intubation was different both clinically and statistically, with p value <0.05.**

Baseline and pre-induction DBP were comparable among both the groups with no statistical significant differences (p>0.05). But there was significant difference between group I and II only at 1 min after intubation. At 5 min after intubation there were no significant differences between both the group Baseline and pre-induction MAP were comparable among both the groups with no statistical significant differences (p>0.05). **But there was significant difference in MAP of two groups at 1 min after intubation.** At 5 min after intubation there were no significant differences between both the groups

Discussion

Induction of anaesthesia is associated with hemodynamic variation of mild to moderate degree depending upon many factors. In our study, we observed that etomidate alone caused significant haemodynamic changes at induction in comparison to etomidate Plus propofol .The main finding of a study conducted by Hosseinzadeh et al. [15], comparing hemodynamic changes during placement of laryngeal mask airway (LMA) using propofol, etomidate and etomidate-propofol combination, was that although dose was reduced of both the drugs in combination more stable hemodynamics was provided by combination of propofol and etomidate compared to propofol and etomidate alone.

In a study performed by Yağan Ö et al. [17], They found that Etomidate-propofol combination may be a valuable alternative when extremes of hypotensive and hypertensive responses due to propofol and etomidate are best to be avoided

There was an added advantage of combining etomidate with propofol for attenuating intubation reflexas compared to etomidate alone

Conclusion

The combination of Etomidate plus Propofol has better hemodynamic stability than Etomidate alone at 1 minute after intubation though Etomidate was equally stable at other points of time. And, the combination proved to be significantly better than Etomidate alone. Not using BIS to measure the depth of anesthesia is a major limitation of our study. Another limitation is not measuring plasma cortisol and adrenocorticotropin hormone level. But it has been reported that adrenal suppression after single dose of etomidate is transient and clinically unimportant

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