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SLEEP DOSE OF THIOPENTONE SODIUM VS ETOMIDATE FOR ATTENUATION OF STRESS RESPONSE DURING LARYNGOSCOPY

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ABSTRACT

BACKGROUND: Stress response resulting from intubation, extubation and surgical stimulus can lead to some haemodynamic changes like elevated heart rate and blood pressure. This may be detrimental in high risk patients like those with cardiac disease. This study aims to compare the haemodynamic effects of etomidate and thiopental by measuring cardiac output and arterial tension values at the stress response during laryngoscopy of patients undergoing elective surgery.

MATERIALS AND METHODS: This prospective study was conducted on 60 adult, ASA grade-1 and 2 patients, aged between 18-60 years of either sex, undergoing elective surgeries in general surgery, orthopedics, urology and gynaecological surgeries. The patients were randomly assigned into two groups of 30 each.Group – E: Etomidate Group – T: Thiopentone. The hemodynamic parameters namely pulse rate, systolic and diastolic blood pressure were recorded before induction, after induction, after intubation 1 min, 3 minutes and 5 minutes after intubation. The data was analyzed using unpaired "t" test.

RESULTS: Both the group were statistically comparable with regard to the mean heart rate where it was statistically significant at the induction and post intubation ($P < 0.05$). Group E showed a Both the groups were statistically comparable with regard to the systolic blood pressure and it was statistically significant at post induction ($P < 0.05$) Group E showed a stable systolic blood pressures when compared to Group T during induction & post intubation.
better stability when compared to Group T at these time frames.

CONCLUSION: It's concluded that, in this study, the etomidate is safer than thiopental in terms of providing haemodynamic stability to the patient during induction and post intubation.

KEYWORDS : Etomidate, Thiopentone, Hemodyanamic, Stress Response, Intubation.

INTRODUCTION:

Stress response resulting from intubation, extubation and surgical stimulus can lead to some haemodynamic changes. Cardiovascular depression during the induction of anaesthesia and the stress response caused by endotracheal intubation are factors to consider, especially for patients who are under cardiac risk. This haemodynamic response affects myocardial perfusion in a negative way by increasing myocardial oxygen consumption and cardiac workload, thereby leading to ischaemia [1]. Stimulation of laryngeal and tracheal tissues during intubation causes catecholamine discharge, with an increase in sympathetico-adrenergic activity and also an increase in systemic arterial pressure and heart rate [2, 3]. These changes begin with laryngoscopy, reach to the maximum level within 1-2 minutes and then decrease back to the values before the laryngoscopy [4-6]. Extrasystoles and ventricular premature beats can also be seen in this period [7,8]. Use of intravenous induction agents can often cause hypotension. Many mechanisms have been described for this response, but the most important of these are the suppressive effects of these agents on myocardial contractility, sympathetic activity, baroreflex activity and central nervous system activity [9-12]. This study aims to compare the haemodynamic effects of etomidate and thiopental by measuring cardiac output and arterial tension values at the stress response during laryngoscopy of patients undergoing elective surgery.

MATERIALS AND METHODS:

After institutional approval, this prospective study was conducted on 60 adult, ASA grade-1 and 2 patients, aged between 18-60 years of either sex, undergoing elective surgeries in general surgery, orthopedics, urology and gynaecological surgeries.

The patients were randomly assigned into two groups of 30 each by computer generated random number.

Group – E: Etomidate group
Group – T: Thiopentone group.

PREANESTHETIC EVALUATION:

Patients were visited on the previous day of surgery and the procedure was explained to them. All patients were given anxiolytic tablet diazepam 5-10 mg at bed time on day before the surgery. A detailed medical history was taken and systemic examination was carried out and relevant investigations were advised.

An informed written consent was taken from all patients and all patients kept fasting for 8 hours. Patients under following categories were excluded from the study.

1. Patients below 18 years and above 60 years
2. Morbidly obese patients
3. Patients with history of drug allergy
4. Patients with MPC class 3 & 4
5. Patients with respiratory disease
6. Patients with cardiovascular disease
7. Patients with history of smoking, severe systemic disease and neurological disease.

Basic laboratory investigations like complete hemogram, blood sugar, blood urea, routine urine analysis, ECG and chest X-ray are done in all patients.

ANESTHETIC TECHNIQUE:

On arrival in the operating theatre, intravenous line was secured and the patients baseline vital were recorded using pulseoximeter, NIBP. All resuscitation equipment kept ready.

The ET tube size was chosen accordingly to the manufacturer's recommendation. Prior to intubation, ET tube was deflated. Both groups received injection fentanyl 2microg/kg intravenously and injection glycopyrolate 0.2 mg intravenously, inj ondansetron 4 mg i.v, given 3 minutes prior to induction.

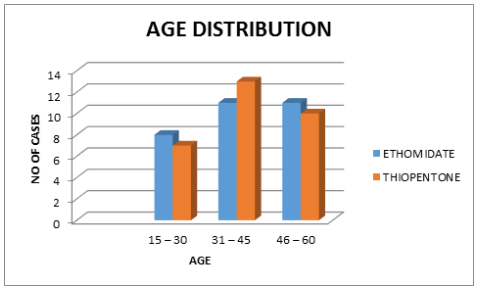
The patient was positioned supine with a head ring under the head. All patients were pre-oxygenated for three minutes with 100% oxygen using a fresh gas flow 6- 8 L/min breathed through Magill's circuit.

In group-1 (Etomidate), anesthesia was induced with Etomidate 0.3mg/kg. The induction agent was injected at a constant rate over 60-90 seconds. After further 30 seconds, adequacy of anesthesia was assessed (loss of response to verbal commands, loss of eyelash reflex and jaw muscle relaxation). If it was found to be adequate, with appropriate size of ET tube intubation was done. Bilateral adequate air entry is checked by 5 point auscultation fixed.

In group-2 (thiopentone), the patients were induced with thiopentone 3mg/kg while intubated with ET tube, adequacy of anesthesia was assessed as mentioned in group-1. Anesthesia was maintained with 66% nitrous oxide in oxygen after intubation. In both the groups, surgeon was not allowed to touch the patient till the completion of study.The hemodynamic parameters namely pulse rate, systolic and diastolic blood pressure were recorded before induction, after induction, after intubation 1 min, 3 minutes and 5 minutes after intubation. The data was analyzed using unpaired "t" test.

RESULTS

AGE



Among the total cases, In Etomidate group 26% belong to the age group 15 - 30 years, 37% belong to 31 - 45 years and 37 % belong to 46 – 60 years. In Thiopentone group, 23 % belong to the age group 15 – 30 years, 43 % belong to 31 – 45 years and 34 % belong to 46 – 60 years.The minimum age of the patient was 20 years and the maximum age of the patient was 50 years in the study groups.

MEAN HEART RATE

S No	Time of observation	HR (Bt/Min)		P value
		Mean	SD	
1	Baseline Group E Group T	87.25 84.96	18.09 13.06	0.051
2	Pre-Induction Group E Group T	91.72 87.16	13.68 13.31	0.130
3	Induction Group E Group T	91.96 87.23	12.94 12.86	0.142
4	Post intubation 1 min Group E Group T	88.76 87.01	11.29 12.66	0.001
5	Post intubation 3 min Group E Group T	88.31 87.68	14.15 12.11	0.018
6	Post intubation 5 min Group E Group T	87.35 87.01	11.45 12.34	0.04

Both the groups were statistically comparable with regard to the mean heart rate upto induction period and it was statistically significant at post induction 1 minute, 3 minutes and 5 minutes interval.

MEAN SYSTOLIC BLOOD PRESSURE

S No	Time of observation	SBP (mm/Hg)		P value
		Mean	SD	
1	Baseline Group E Group T	119.77 118.23	11.28 11.40	0.184
2	Pre-Induction Group E Group T	115.83 112.73	13.24 12.11	0.214
3	Induction Group E Group T	115.60 106.60	14.40 14.43	0.000
4	Post intubation 1 min Group E Group T	114.46 103.13	13.52 12.54	0.014
5	Post intubation 3 min Group E Group T	107.75 103.43	14.47 14.62	0.021
6	Post intubation 5 min Group E Group T	108.34 107.13	13.52 12.75	0.001

Both the groups were statistically comparable with regard to the systolic blood pressure and it was statistically significant at post induction ($P < 0.05$) Group E showed a stable systolic blood pressures when compared to Group T during induction & post intubation.

MEAN DIASTOLIC BLOOD PRESSURE

S No	Time of observation	DBP (mm/Hg)		P value
		MEAN	SD	
1	Baseline Group E Group T	82.19 79.27	7.95 8.11	0.513
2	Pre-Induction Group E Group T	78.42 73.45	8.85 8.78	0.104
3	Induction Group E Group T	78.45 71.14	12.15 9.74	0.000
4	Post intubation 1 min Group E Group T	78.24 68.24	6.72 9.74	0.004
5	Post intubation 3 min Group E Group T	78.41 69.26	6.81 9.26	0.002
6	Post intubation 5 min Group T Group E	74.52 64.25	12.14 10.47	0.013

Both the groups were statistically comparable with regard to the diastolic blood pressure where it was statistically significant at the induction and post intubation ($P < 0.05$). Group E showed a better stability when compared to Group T at these time frames.

DISCUSSION

During anaesthesia induction or tracheal intubation, some distinct changes can be observed in haemodynamic parameters, depending on the effects of the anaesthetic drugs and adrenergic status of the patients. With supraglottic stimulation by laryngoscopy, an increase occurs in the arterial pressures of patients. Moreover, the levels of catecholamine increase with stimulation of infraglottic receptors during insertion of the endotracheal tube[13]

The mechanism of the cardiac-depressive effect caused by intravenous anaesthetic agents has not been explained clearly. It is thought that this effect results from decreased preload and afterload and direct myocardial depression [14,15] Although the mechanism of negative inotropic effects caused by intravenous anaesthetics is not exactly known, information on this issue is increasing day by day with in vivo and in vitro studies. The use of etomidate, having less of a cardiac-depressive effect, is safer in cardiac patients, but the sympathoadrenal-suppressive effects limit its usage [68,73] The multilateral cardiovascular effects of anaesthesia can be influenced by anaesthetic drug combination, antihypertensive drugs received by the patients, beta-blockers and calcium channel blockers, the way of respiration, acid-base equilibrium and fluid-electrolyte balance, and they can become more complex.It was found that the contractility of the heart changed little, and heart rate, cardiac output and stroke volume stayed stable in patients receiving etomidate

Haris etal evaluated thiopental (4 mg kg-1), etomidate (0.3 mg kg-1) and propofol (2.5 mg kg-1) in tracheal intubation by adding 2 µg kg-1 fentanyl. They detected that there was a significant decrease in SAP values in the group receiving only propofol, and there were significant increases in SAP values in the group receiving only thiopental and etomidate after intubation. In our study, decreases in SAP values were observed with receiving thiopentone (group –T).

CONCLUSION

It's concluded that, in this study, the etomidate is safer than thiopental in terms of providing haemodynamic stability to the patient during induction and post intubation.

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