



RESEARCH ARTICLE

OBSERVATIONAL STUDY OF ETOMIDATE AND THIOPENTONE AS INDUCTION AGENT IN CARDIAC SURGERY PATIENTS.

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Manuscript Info

Abstract

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Introduction:-

The Induction of general anesthesia allowed Surgeons to operate with careful deliberation on patients made totally unaware and pain free.

With this arose the problem of inducing quick and reversible unconsciousness with minimal side effects. This was initially tried with inhalation agents and later intravenous agents.

The ideal intravenous induction agent would provide hypnosis, amnesia, analgesia, muscle relaxation without undesirable cardiac and respiratory depression and pleasantly induce anesthesia in one arm brain circulation time and completely wears off in a few minutes.

Thiopentone has been the routine induction agent of anesthesia since 1930's because of its rapid and predictable action. The main drawbacks are cardiovascular and respiratory depression, increased incidence of Laryngospasm, bronchospasm, allergic reactions. Thiopentone has survived the test of time as an intravenous anesthesia drug.

The research for a better inducing agent which has good control of hemodynamic changes during intubation, The different agent like Etomidate have been tried with varied success.

The Etomidate was introduced into clinical practice in 1972. Its properties include hemodynamic stability, minimal respiratory depression, cerebral protection and rapid recovery after either a single dose or a continuous infusion. In practice these patients are compromised by trauma, serious illness, shock or cardiovascular co- morbidity. The fast onset of anesthesia and high therapeutic index for cardiovascular side effects are helpful during a rapid sequence induction.

Our study allows evaluation of Etomidate in comparison with Thiopentone sodium as an induction agent. This study aims an attempt to compare hemodynamic changes and other untoward effects of both the drugs.

Aims and objectives:-

Among patients who come to a tertiary care hospital with select chronic disease (cardiovascular disease).

- To study hemodynamic changes after ETOMIDATE and THIOPENTONE usage.

- To study any complication arising as result of side effect of the etomidate and thiopentone if any

Methodology:-

Source and method of collection of data:-

An observational study of etomidate with thiopentone as an induction agent in cardiac surgery patients. After permission and clearance from the ethical committee, this study was conducted in Dhiraj general hospital in Department of Anesthesiology. We did this study on 60 patients of Grade-I, II and III of American Society Of Anesthesiologist's (ASA) classification who were admitted for elective cardiac surgeries. The study was prospective in nature. All the patients participating in the study were explained clearly about the purpose and nature of the study in the language they can understand. They were included in the study only after obtaining a written informed consent. A cross sectional analysis was made at the time of presentation. We collected the data for 1.5 years and analyze the data statistically.

Inclusion criteria:-

Patients between the age group of 45 to 65 years of both sex belonging to American society of anesthesiology grade II to III undergoing elective cardiac surgery under general anesthesia.

Adult patients posted for CABG:-

Patients were randomly divided into 2 groups of 30 each

- a. Group E(30 patients) to be induced with inj.etomidate 0.3mg/kg IV
- b. Group T(30 patients) to be induced with inj. thiopentone 5mg/kg IV

Exclusion criteria:-

1. Patient refusal
2. History of allergic reaction to the drug under study.
3. Patients with renal and hepatic disease.
4. Patients with history of epilepsy
5. Carotid insufficiency.
6. Adrenal insufficiency.
7. ASA GRADE IV
8. Presence of hypotension
9. History of arrhythmia

Reoperative preparation:-

Tab. Alprazolam 0.5 mg were given on the night prior to surgery. Patients were asked to restrict fluids and solids by mouth at least eight hours before operation. The patients were reassured, the procedure of anesthesia explained and a written informed consent was obtained from them.

Patient were taken inside the operation theater. Oxygen was given by face mask. Intravenous line was secured with 16G or 18G cannula and the patients were given I.V.Fluids (NS) according to the requirement. Multipara monitors were attached and base line pulse rate, respiratory rate, non-invasive blood pressure, SPO₂ and ECG were recorded. Under local anaesthesia a right radial artery is cannulated for invasive pressure monitoring and central venous line in right internal jugular vein for CVP monitoring was inserted.

Patient were premedicated with inj.glycopyrrolate 0.2 mg, inj. ondansetron 4mg. Intravenous inj.fentanyl 5mcg/kg was given over one minute before induction. Patients were randomized into two groups group E and group T, for patients receiving etomidate and thiopentone respectively. After preoxygenation with 100% oxygen for 3-5 mins, Induction of anaesthesia was done either with etomidate 0.3 mg/kg or thiopentone 5 mg /kg. Loss of eye lash reflexes and lack of response to verbal commands was considered to be as end point of induction. Followed by this inj succinylcholine in doses of 1.5-2mg/kg was given (depolarizing muscle relaxant) to facilitate tracheal intubation, patient was intubated after 1min of interval.

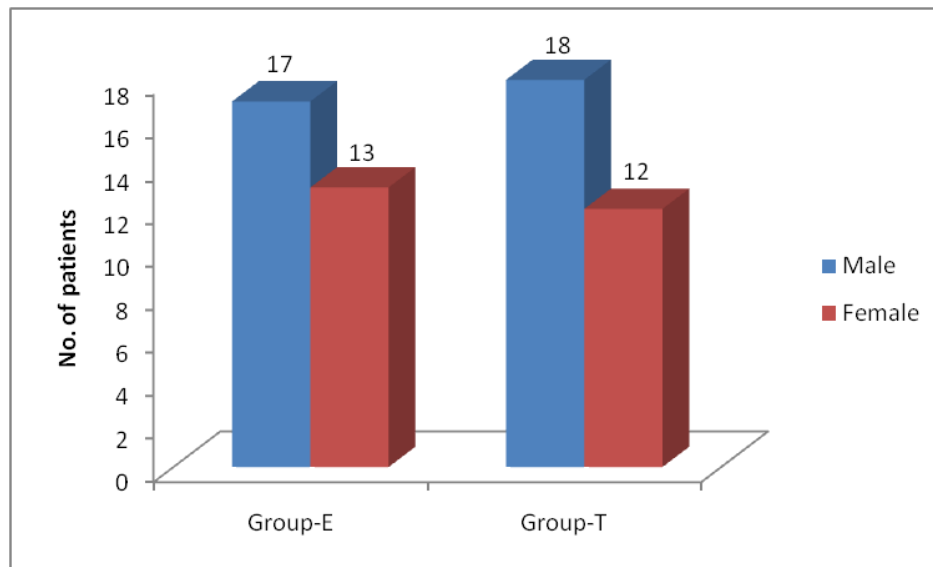
After confirming the proper position of endotracheal tube, it was connected to anaesthesia circuit. Patient was ventilated with 50% oxygen and 50% air along with inhalation agent and maintained with intravenous inj vecuronium. 0.1 mg/kg

Observation and Results:-

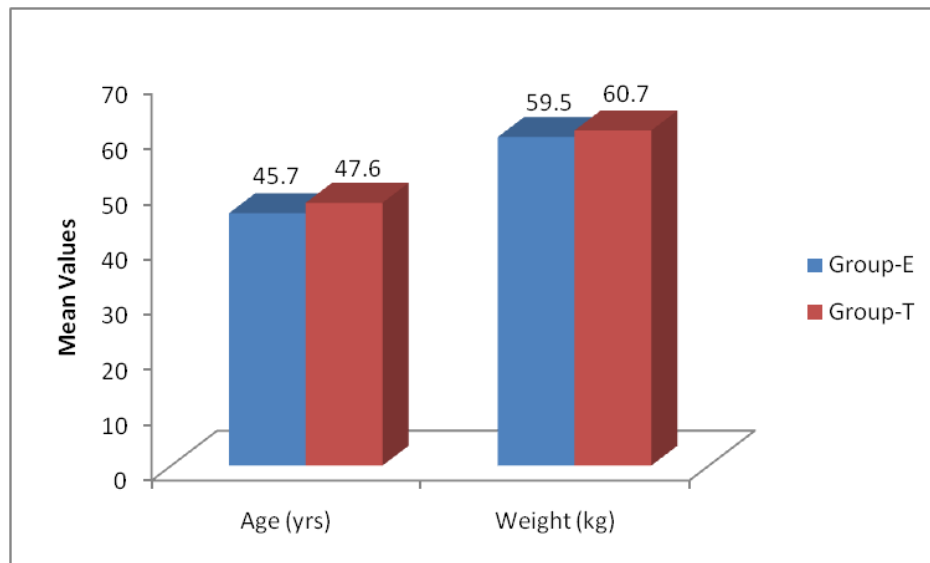
Sixty patients of grade-II and III of American Society Of Anesthesiologists (ASA) classification were taken for study in elective cardiac surgeries. They were allocated randomly in two equal groups. (Group E - inj. Etomidate 0.3mg/kg and Group T- inj.Thiopentone 5 mg/kg)

Demographic data:-**Table 1:-** Demographic Characteristics

Variable	Group E	Group T	p-value
Age (years)	45.70 \pm 9.15	47.60 \pm 9.27	0.427
Weight (kg)	59.50 \pm 8.56	60.70 \pm 9.27	0.604
Sex (M/F)	17(56.7%) / 13(43.3%)	18(60%) / 12(40%)	0.793



The distribution of patients with respect to sex were comparable in both groups.(p=0.793)



Fairly stable distribution of age confirms the hypothesis that the two groups were not different in the age. The mean Age in Group E was 45.70 \pm 9.15years while in Group T it was 47.60 \pm 9.268 years which was statistically non significant(p>0.05.)

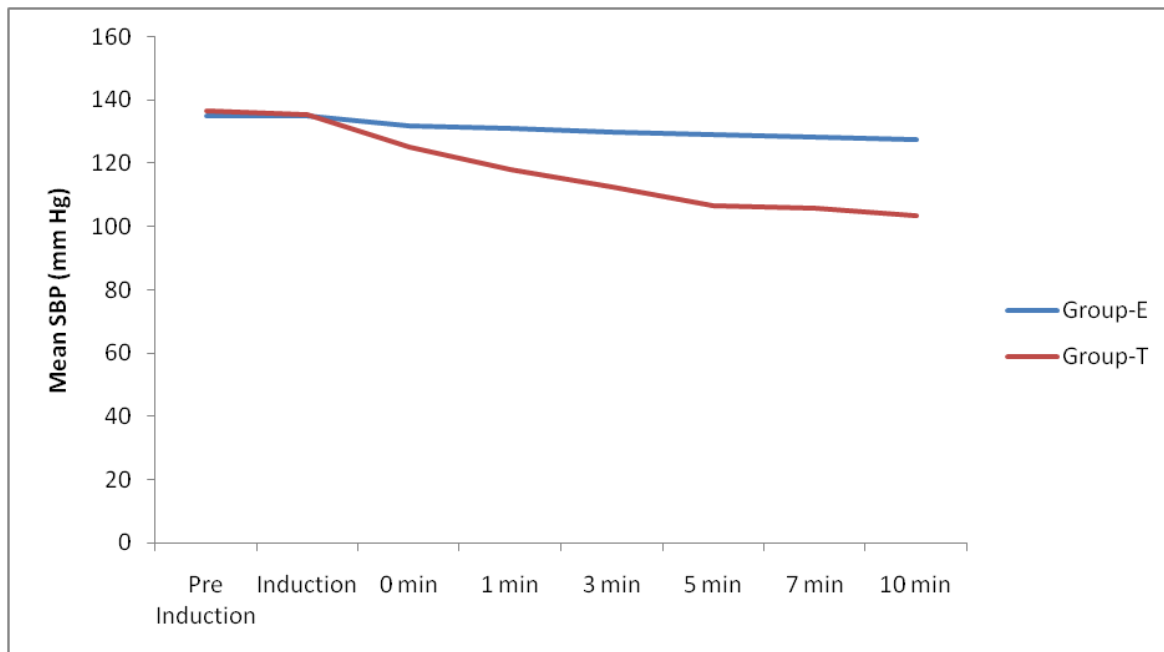
Fairly stable distribution of weight confirms the hypothesis that the two groups were not different in the weight. The mean weight in Group E was 59.50 ± 8.561 years while in Group T it was 60.70 ± 9.267 years which was statistically non significant ($p > 0.05$.)

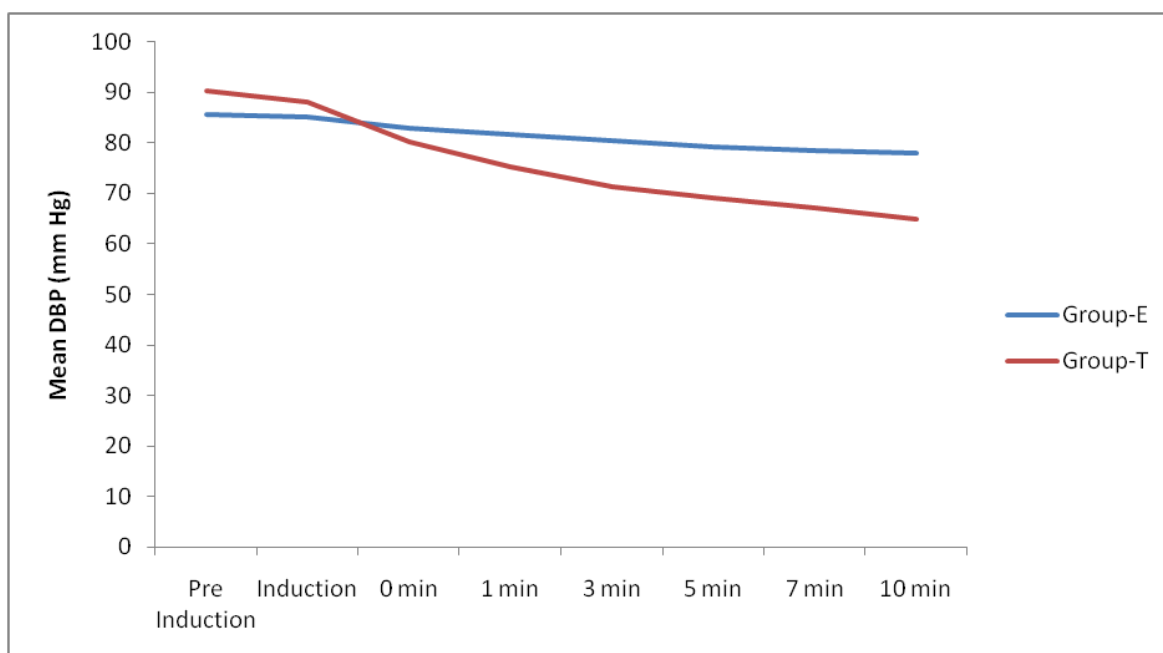
:Mean systolic blood pressure at different intervals in both the groups

SBP	Group-E	Group-T	p-value
Pre Induction	134.8 ± 19.782	136.67 ± 20.044	0.718
Induction	134.93 ± 19.713	135.6 ± 19.871	0.897
0 min	131.73 ± 19.446	125.33 ± 17.223	0.182
1 min	130.87 ± 19.339	118.07 ± 15.892	0.007
3 min	129.6 ± 19.521	112.4 ± 14.087	<0.001
5 min	128.87 ± 19.622	106.6 ± 10.994	<0.001
7 min	128.2 ± 19.243	105.8 ± 11.146	<0.001
10 min	127.4 ± 19.206	103.33 ± 10.175	<0.001

Table 8:- Mean diastolic blood pressure at different time intervals in both the groups

DBP	Group-E	Group-T	p-value
Pre Induction	85.53 ± 11.927	90.33 ± 14.143	0.161
Induction	84.93 ± 11.408	88 ± 15.447	0.385
0 min	82.8 ± 11.418	80.13 ± 13.224	0.407
1 min	81.67 ± 11.722	75.13 ± 11.881	0.036
3 min	80.33 ± 11.46	71.27 ± 12.233	0.004
5 min	79.27 ± 11.246	69 ± 13.023	0.002
7 min	78.4 ± 11.294	67.13 ± 11.916	<0.001
10 min	78 ± 11.179	64.87 ± 11.163	<0.001





SBP and DBP were recorded at preinduction, induction, intubation, 1, 2, 3, 5, 7 & 10 min from the start of the injection of the drug. Both systolic blood pressure and diastolic blood pressure changes were very minimal in group-E. There was a fall in systolic blood pressure and diastolic blood pressure in Group-T at 3, 5, 7 minute and 10 minutes. The difference in both SBP & DBP between group E and group T at 3, 5, 7 & 10 min was statistically highly significant ($P < 0.001$).

Discussion:-

Systolic blood pressure:-

In etomidate group pre induction SBP was 134.8 ± 19.782 . In post induction SBP 134.93 ± 19.713 . Again SBP after intubation 0 min, 1 min, 3 min, 5 min, 10 min were 131.73 ± 19.446 , 130.87 ± 19.339 , 129.6 ± 19.521 , 128.87 ± 19.622 , 127.4 ± 19.206 respectively. There was no significant change in SBP in post induction and after intubation compared to pre induction value and also no significant change after intubation compared to pre induction and post induction value.

In thiopentone group pre induction SBP was 136.67 ± 20.044 . In post induction SBP 135.6 ± 19.871 . Again SBP after intubation 0 min, 1 min, 3 min, 5 min, 10 min were 125.33 ± 17.223 , 118.07 ± 15.892 , 112.4 ± 14.087 , 106.6 ± 10.994 , 103.33 ± 10.175 respectively. There was no significant change in SBP in post induction and after intubation compared to pre induction value and also no significant change after intubation compared to pre induction and post induction value.

Diastolic blood pressure:-

In etomidate group, pre induction DBP was 85.53 ± 11.927 . In post induction, DBP was 84.93 ± 11.408 . After intubation 0 min, 1 min, 3 min, 5 min, 10 min DBP were 82.8 ± 11.418 , 81.32 ± 4.78 , 81.3 ± 4.7 , 79.9 ± 4.9 and 78.93 ± 5.0 respectively. There was no significant change in DBP in post induction and after intubation compared to pre induction and after intubation compared to post induction.

In thiopentone group, pre induction DBP was 90.33 ± 14.143 . In post induction, DBP was 88 ± 15.447 . After intubation 0 min, 1 min, 3 min, 5 min, 10 min DBP were 80.13 ± 13.224 , 75.13 ± 11.881 , 71.27 ± 12.233 , 69 ± 13.023 and 64.87 ± 11.163 respectively. There was significant change in DBP in post induction and after intubation compared to pre induction and after intubation compared to post induction.

Summary:-

The present study was conducted on 60 patients' age group between 45-65 years belonging to ASA grade II AND III. These patients were scheduled for elective cardiac surgeries.

Sixty patients were randomly selected, and divided into two groups with thirty patients in each group. Group E patients were induced with Inj. Etomidate 0.3mg/kg and Group T patients were induced with Inj. Thiopentone 5mg/kg. as an induction agent.

The following parameters were compared between the group E and group T, pain on injection, myoclonus, induction time and hemodynamic parameters.

Incidence of pain on injection is about 50% of the patients induced with Etomidate and absent in Thiopentone group. Myoclonus occurred in about 43% patients in etomidate group compared to 13% patients in thiopentone group.

Induction time was faster with Inj. Etomidate, which induced anesthesia at an average about 25 ± 3.2 seconds. Thiopental induced anesthesia at an average about 31 ± 4.5 seconds.

Hemodynamic changes with respect to the heart rate and blood pressure changes after premedication were minimal in both groups. At the time of induction there was minimal fall in blood pressure in Etomidate group but blood pressure significantly decreased in Thiopentone group.

After the intubation there were minimal changes in Etomidate group. heart rate and blood pressure were significantly raised in Thiopentone group.

To summarize both the groups shared complications like Pain on injection was present after inducing with Etomidate and it was absent in Thiopentone Myoclonus. It was more significant in Etomidate group than Thiopentone group. The induction time was faster and smoother in Etomidate group, when compared with Thiopentone group. Etomidate has reduced cardiovascular response to laryngoscopy and tracheal intubation in comparison with Thiopentone in elective cardiac surgeries.

Conclusion:-

By the present study it can be concluded the induction time is lesser with Inj. Etomidate than Inj. Thiopentone. Etomidate is an effective and rapid acting induction anesthetic agent with good cardiovascular stability.

Finally, we conclude that Inj. Etomidate can be safe, hemodynamically stable and effective alternative to Inj. Thiopentone for the induction of general anesthesia in elective cardiac surgeries.

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