



ORIGINAL RESEARCH PAPER

Anaesthesiology

A COMPARITIVE STUDY OF HEMODYNAMIC RESPONSE DURING INTUBATION WITH ETOMIDATE AND PROPOFOL IN ADULTS FOR ELECTIVE SURGERIES REQUIRING GENERAL ANAESTHESIA

KEY WORDS:

| | |
|--------------------------------|---|
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ABSTRACT

INTRODUCTION : Etomidate and Propofol are the preferred agents for inducing anaesthesia. The role of these two agents in elective surgeries is not widely studied, and their supremacy over each other is less known.

We intend to find out a better induction agent that has a less hemodynamic response for apatient undergoing general surgery, considering Etomidate and Propofol as induction agents.

Methodology : 100 patients between the ages of 18 to 65 undergoing Elective General surgery requiring General anaesthesia were randomized as two groups of 50 each.

Patients were shifted to the operating room, an intravenous line with 18G IV cannula was secured in the non-dominant hand. Ringer lactate solution at 150ml/hr was started. Basic monitors were attached, and baseline HR, ECG, NIBP, SPO2 were recorded. All patients received Glycopyrrolate 4mcg/kg, Midazolam 0.05 mg/kg and Fentanyl 2mcg/kg i.v.as premedication 15 mins before induction. Patients were preoxygenated with 8l/min of 100% O2 for three mins.

After adequate denitrogenation and the oxygen concentration of 90-100%, patients were induced with Etomidate 0.2 mg/kg/Propofol 2.0 mg/kg slowi.v and after ventilation was manually assisted. Intubation was facilitated with Succinylcholine 1 to 1.5 mg/kg IV and see for the jaw relaxation every 15 seconds till complete relaxation. Patients were assigned into two groups:

Group E – Etomidate 0.2 mg/kg I.V.

Group P – Propofol 2.0 mg/kg I.V.

Intubation : Laryngoscopy and intubation were done quickly with least hemodynamic response, Proper placement of tube was confirmed by auscultation of both the lung field Cuff inflated and fixed

Nitrous oxide 67% and 33% of Oxygen

At the end of the operation reversal with the inj. Neostigmine and glycopyrrolate

After watching adequate tidal exchange and return of protective reflux,

Protrusion of tongue

Wide opening of eye

Sustain head lift for 5 sec

Ability to take a deep breath

Moving and raising the limbs , patient extubated and observed

Recordings: Followings parameters are recorded during the surgery

Pulse

Systolic blood pressure

Diastolic blood pressure

Mean arterial pressure

Pre-induction : Value recorded just before the injection of intravenous induction agent which was taken as a baseline value to the study

Post induction : Recordings took just after injection of the intravenous induction agent till injection of muscle relaxant which was taken as abaseline value to study the haemodynamics changes of intubation till 10 min after intubation.

Post-intubation Recordings just after intubation (0min) 1 min, 3 min,5min,10 min after intubation :

Post induction and after intubation 0 mt,1mt, 3mt,5mt and 10 mt were taken to the account for evaluation of hemodynamic response to endotracheal intubation

Statistical Analysis : The data from obtained from each group were analysed statistically and compared by average, standard deviation and T-test P value less than 0.05 was considered significant and more than 0.05 was considered not significant.

RESULTS : The collected data were analysed with IBM.SPSS statistics software 23.0 Version to describe about the data descriptive statistics frequency analysis, percentage analysis were used for categorical variables and the mean & S.D were used for continuous variables. To find the significant difference between the bivariate samples in Independent groups the unpaired sample t-test was used. To find the significance in categorical data Chi-Square test was used. In both the above statistical tools the probability value 0.05 is considered as significant level.

CONCLUSIONS : Etomidate is hemodynamically more stable than Propofol for inducing anesthesia.

INTRODUCTION

The magnitude of the response during laryngoscopy and endotracheal tube intubation are the stimuli that can increase the adrenal secretion response to cardiovascular, respiratory and other systems, that elevate the blood pressure and heart rate start within seconds of laryngoscopy and increases in 1 to 2 minutes and return to a reasonable level within 10 minutes. Hemodynamic variations start within seconds of direct laryngoscopy, and there is a further increase in heart rate and blood pressure with the passage of the endotracheal tube.

Nowadays to blunt the hemodynamic response is by the use of better induction agent, thereby decreasing the conscious level of the patient for intubation. A good induction agent should have;

- Rapid and smooth onset of action
- Amnesia
- Analgesia
- Provide better intubating condition
- Adequate muscle relaxation with rapid recovery
- No adverse effect in the postoperative period.

The cardiovascular changes and the lack of stability in the hemodynamic system along with an overrated response to intubation lead to a mismatch in myocardial oxygen supply and demand. This has resulted in the challenges during the induction of anaesthesia in patients. This necessitates the maintenance of this demand-supply balance in the patients to maintain myocardial stability.

Induction agents used are;

Thiopentone
Propofol
Etomidate

In the agents mentioned above, Etomidate and Propofol are the preferred agents for inducing anaesthesia. The role of these two agents in elective surgeries is not widely studied, and their supremacy over each other is less known.

AIMS AND OBJECTIVES

AIMS

The primary aim of the study is to compare the Hemodynamic response during intubation using Etomidate or Propofol for elective surgery needing general anaesthesia.

PRIMARY OBJECTIVES:

Primary objectives of the study was to assess the;
Intra-operative heart rate (HR)
Systolic blood pressure
Diastolic blood pressure
Mean arterial pressure

SECONDARY OBJECTIVE:

The secondary objective was to assess;
Which drug has least intubation response
Additional induction dose
Post operative nausea and vomiting
Myoclonus
Bradycardia

MATERIALS AND METHODS

Place of study:

Department of General Surgery, Stanley medical college and hospital

Study design:

This was a randomized, prospective comparative study conducted on 100 patients over a period of six months. Patients were explained about the procedure in detail and informed written consent was obtained. The approval of the Institutional Ethical Committee was attained.

Selection of cases

From cases undergoing elective surgery requiring general anaesthesia

Sample size

Based on a previous study, the Hemodynamic stability is well with Etomidate than Propofol. The statistical power of the study was 95 % and the α error is 0.05. The sample size was calculated with the formula given below

HR after 5mts SD $4.8 \mu 1 = 81.6 \mu 2 = 76.8 d = 4.8 Z_{.95} = 1.96$

Power of the Test 90 % = 1.29

Allowable Error of 10 %

$(4X pq/d_2)^2$

$4 \times 4.8 \times 4.8 \times 10.56 / 4.8 \times 4.8 = 42.25$

Non response 10 % = $42.25 + 4.225 = 46.5 = 47$

Each arm = 47

Type 1 error as 5 % Power as 90% non response 10 %

Pre-anesthetic evaluation

Pre-anesthetic assessment recording a detailed history and

complete physical examination was performed. Complete blood count, renal function test, blood grouping/typing, random blood sugar, electrocardiograph and chest x-ray, LFT, serum cortisol level, ECHO were done. Patients not satisfying the inclusion and exclusion criteria were excluded from the study.

Inclusion criteria:

All consented patients of both genders aged between 18-65 yrs, the weight of 50 to 70 kg belonging to ASA PS I - II - III undergoing elective general Surgery requiring General anaesthesia were included in the study.

Exclusion criteria

ASA Physical status IV
Chronic pulmonary disease
Any Hepatic, Renal, Circulatory, Bleeding disorder
Drug allergy
Pregnancy

Materials

The following equipment, drugs and monitors were kept ready for the conduct of anaesthesia.

Equipments

Anaesthesia workstation with ventilator
Bain's circuit
Laryngoscope with all sizes of blades.
Endotracheal Tubes - 6 mm ID to 8.5 mm ID.
Oropharyngeal airways
Oxygen source
Suction Apparatus
Desflurane vaporiser
Sevoflurane vaporiser
Ambu bag
End-tidal carbon dioxide analyser
Anaesthesia agent gas monitor
Suction apparatus

Drugs:

Inj. Glycopyrrrolate
Inj. Midazolam
Inj. Fentanyl
Inj. ETOMIDATE
Inj. PROPOFOL
Inj. Succinylcholine
Inj. Ondansetron
Inj. Dexamethasone
Desflurane
Sevoflurane

Emergency drugs:

Inj. Atropine
Inj. Ephedrine
Inj. Adrenaline
Inj. Frusemide
Inj. Hydrocortisone
Inj. Nitro-glycerine
Inj. Dopamine

Monitors:

Continuous ECG
Pulse oximeter
Non-invasive blood pressure
End-tidal carbon dioxide
Oxygen analyser
Anaesthesia gas monitors for Nitrous oxide, Desflurane and Sevoflurane

RESULTS:

Study groups

The following figure demonstrates the randomisation of patients. There were 50 patients in both groups.

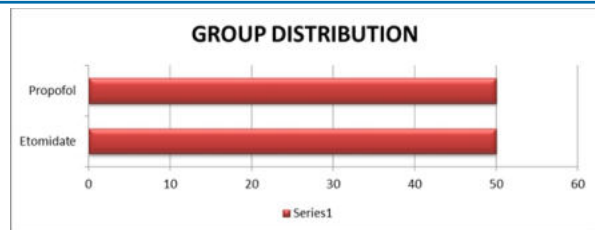


Figure 1: Group distribution

Demographic profile

Age distribution

Majority of them were in the age group of 31-40 years (52%, n=52). The following figure illustrates the age distribution of the sample.

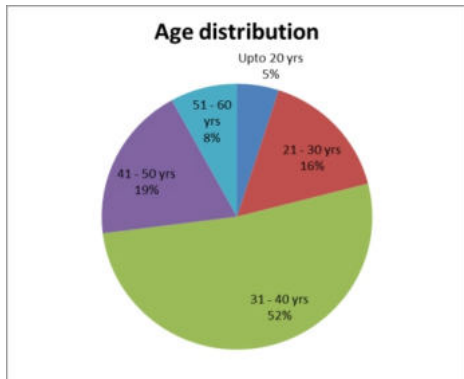


Figure 2: Age distribution of the sample

Age distribution among different groups

In the group that was administered Propofol, 56% of them were in the age group of 31-40 years while in Etomidate group, it was 48%. Both the groups were comparable in age wise distribution. The following figure illustrates this.

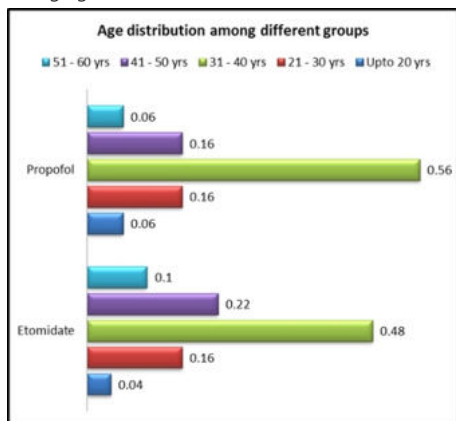


Figure 3: Age distribution among different groups

Age mean in different groups (Etomidate and Propofol)

The following figure shows how the mean of the age is distributed among different groups. Etomidate group had a higher age mean.

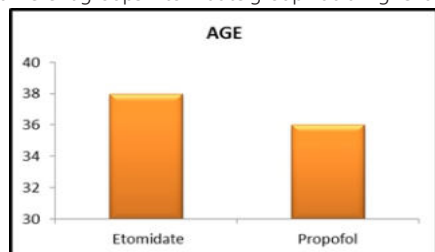


Figure 4: Mean age distribution among different groups

Weight mean in different groups (Etomidate and Propofol)

The following figure shows how the mean of the weight is distributed among different groups. Propofol group had a higher weight mean.

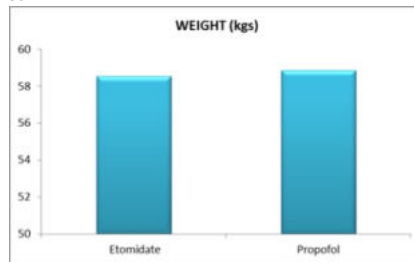


Figure 5: Mean weight distribution among different groups

Gender Distribution

The following figure shows the gender distribution of the sample. Males were more in number (74%, n=74).

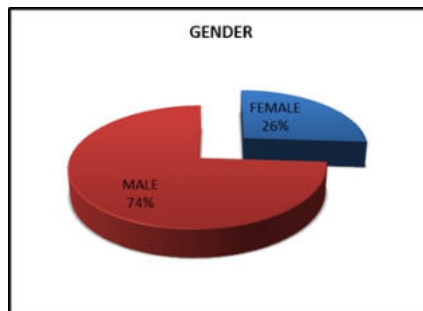


Figure 6: Gender distribution of the sample

Gender distribution among different groups

The following table shows the gender distribution among different groups namely Etomidate and Propofol. The maximum number was males in Etomidate group (39).

Table 1: Gender distribution among different groups

| | Etomidate n (%) | Propofol n (%) |
|--------|-----------------|----------------|
| Female | 11 (22%) | 15 (30%) |
| Male | 39 (78%) | 35 (70%) |

Chi-square test for gender distribution among different groups

The following table shows the chi-square test results for gender distribution among different groups. P value was fixed at 0.05 as significant.

Table 2: Chi-square test for gender distribution among different groups

| | Value | df | Asymp. Sig. (2-sided) |
|--------------------|-------|----|-----------------------|
| Pearson Chi-Square | .921 | 1 | .003 |

Gender distribution within different groups

The following figure shows the gender distribution within different groups namely Etomidate and Propofol. 78% of the sample in Etomidate and 70% of sample in Propofol were males.

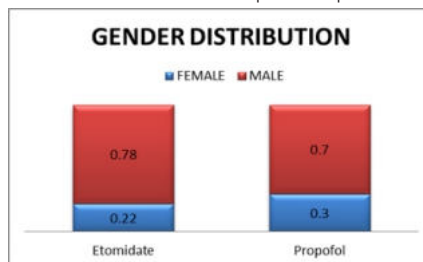


Figure 7: Gender distribution within groups

ASA Physical Status

The following figure shows the ASA Physical Status among the samples. Majority of them (85%, n=85) were in the category I.

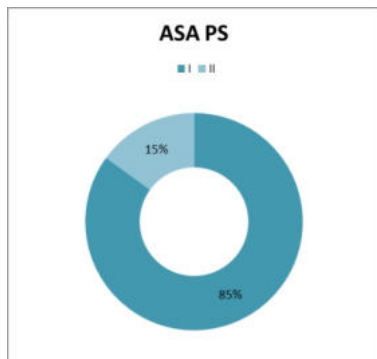


Figure 8: ASA Physical Status of the sample

ASA Physical Status among different groups

The following table shows the ASA Physical Status among the groups. Majority of them (44) were in the category I of Etomidate group.

Table 3: ASA Physical Status of the sample among different groups

| | Etomidate n (%) | Propofol n (%) |
|----|-----------------|----------------|
| I | 44 (88%) | 41 (82%) |
| II | 6 (12%) | 9 (18%) |

ASA Physical Status distribution within different groups

The following figure shows the ASA Physical Status distribution within different groups namely Etomidate and Propofol. 88% of the sample in Etomidate and 82% of sample in Propofol were category I.

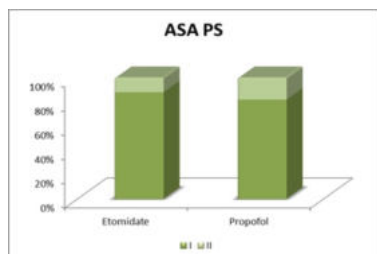


Figure 9: ASA Physical Status of the sample within different groups

Chi-square test for ASA Physical status distribution among different groups

The following table shows the chi-square test results for ASA PS distribution among different groups. P value was fixed at 0.05 as significant.

Table 4: Chi-square test for ASA PS distribution among different groups

| | Value | df | Asymp. Sig. (2-sided) |
|--------------------|-------|----|-----------------------|
| Pearson Chi-Square | .872 | 1 | .002 |

Inferential Statistics

The following tables show the Independent t-test among different groups Etomidate and Propofol and their variation in terms of age and weight. The following table shows the mean and standard deviation of the sample among different groups.

Table 5: Descriptive statistics

| T-Test | | | | | |
|--------|-----------|------|----------------|-----------------|-------|
| GROUPS | N | Mean | Std. Deviation | Std. Error Mean | |
| AGE | Etomidate | 50 | 37.98 | 9.142 | 1.293 |
| | Propofol | 50 | 36.48 | 9.459 | 1.338 |

| WEIGHT (kgs) | Etomidate | 50 | 58.54 | 6.456 | .913 |
|--------------|-----------|----|-------|-------|------|
| | Propofol | 50 | 58.86 | 6.518 | .922 |

The following table shows the t-test results of age and weight. The results have been reported assuming equal variances. Significant is fixed at 0.05. The value for age is 0.532 while for weight is -0.217.

Table 6: T-test for age and weight

| | Levene's Test for Equality of Variances | t-test for Equality of Means | | | | | | | |
|--------------|---|------------------------------|------|-----|----|-----------------|-----------------|---|-------|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | Lower | Upper |
| AGE | Equal variances assumed | .203 | .617 | .53 | 98 | <.05 | 1.500 | -2.192 | 5.192 |
| WEIGHT (kgs) | Equal variances assumed | .071 | .818 | -.2 | 98 | <.05 | -.320 | -2.895 | 2.255 |

The following tables show the Independent t-test among different groups Etomidate and Propofol and their variation in terms of heart rate.

Table 7: Descriptive statistics

| T-Test | | | | | |
|--------|-----------|------|----------------|-----------------|-------|
| GROUPS | N | Mean | Std. Deviation | Std. Error Mean | |
| HR PRE | Etomidate | 50 | 88.16 | 10.662 | 1.508 |
| | Propofol | 50 | 92.70 | 11.573 | 1.637 |
| HR IND | Etomidate | 50 | 83.92 | 7.876 | 1.114 |
| | Propofol | 50 | 73.68 | 10.423 | 1.474 |
| HR INT | Etomidate | 50 | 87.96 | 9.446 | 1.336 |
| | Propofol | 50 | 90.58 | 22.902 | 3.239 |
| HR 1 | Etomidate | 50 | 85.18 | 9.845 | 1.392 |
| | Propofol | 50 | 78.36 | 11.582 | 1.638 |
| HR 3 | Etomidate | 50 | 84.84 | 9.873 | 1.396 |
| | Propofol | 50 | 75.90 | 13.465 | 1.904 |
| HR 5 | Etomidate | 50 | 87.26 | 12.237 | 1.731 |
| | Propofol | 50 | 88.96 | 10.455 | 1.479 |
| HR 10 | Etomidate | 50 | 75.96 | 13.070 | 1.848 |
| | Propofol | 50 | 83.08 | 10.677 | 1.510 |

The following table shows the t-test results of heart rate. The results have been reported assuming equal variances. Significant is fixed at 0.05.

The following table shows the t-test results of heart rate.

Table 8: Independent samples t-test

| | Levene's Test for Equality of Variances | t-test for Equality of Means | | | | | | | | |
|--------|---|------------------------------|--------|----|--------|-----------------|-----------------|-----------------------|---|-------|
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | | Lower | Upper |
| HR PRE | 1.172 | .282 | -2.040 | 98 | <0.005 | -4.540 | 2.225 | -8.956 | -.124 | |
| HR IND | .267 | .607 | 5.543 | 98 | <0.005 | 10.240 | 1.848 | 6.574 | 13.906 | |

| | | | | | | | | | |
|-------|-------|------|--------|----|--------|--------|-------|---------|--------|
| HR | 20.79 | .000 | -.748 | 98 | <0.005 | -2.620 | 3.503 | -9.573 | 4.333 |
| INT | 4 | | | | | | | | |
| HR 1 | .822 | .367 | 3.172 | 98 | <0.005 | 6.820 | 2.150 | 2.554 | 11.086 |
| HR 3 | 5.773 | .018 | 3.786 | 98 | <0.005 | 8.940 | 2.361 | 4.254 | 13.626 |
| HR 5 | .988 | .323 | -.747 | 98 | <0.005 | -1.700 | 2.276 | -6.217 | 2.817 |
| HR 10 | 3.430 | .067 | -2.983 | 98 | <0.005 | -7.120 | 2.387 | -11.856 | -2.384 |

The following tables show the Independent t-test among different groups Etomidate and Propofol and their variation in terms of MAP.

Table 9: Descriptive statistics

| T-Test | | | | | | | | | |
|------------------|-----------|------|----------------|-----------------|---------|--|--|--|--|
| Group Statistics | | | | | | | | | |
| GROUPS | N | Mean | Std. Deviation | Std. Error Mean | | | | | |
| MAP PRE | Etomidate | 50 | 94.9000 | 8.17003 | 1.15542 | | | | |
| | Propofol | 50 | 98.5200 | 8.08435 | 1.14330 | | | | |
| MAP IND | Etomidate | 50 | 91.8533 | 4.60364 | .65105 | | | | |
| | Propofol | 50 | 80.8933 | 7.49132 | 1.05943 | | | | |
| MAP INT | Etomidate | 50 | 96.3000 | 10.85448 | 1.53506 | | | | |
| | Propofol | 50 | 94.5133 | 10.72903 | 1.51731 | | | | |
| MAP 1 | Etomidate | 50 | 91.8933 | 7.02262 | .99315 | | | | |
| | Propofol | 50 | 84.8333 | 9.67575 | 1.36836 | | | | |
| MAP 3 | Etomidate | 50 | 90.1733 | 7.00089 | .99008 | | | | |
| | Propofol | 50 | 84.2000 | 9.40425 | 1.32996 | | | | |
| MAP 5 | Etomidate | 50 | 93.3333 | 9.99887 | 1.41405 | | | | |
| | Propofol | 50 | 93.3800 | 7.40013 | 1.04654 | | | | |
| MAP 10 | Etomidate | 50 | 90.1867 | 6.17807 | .87371 | | | | |
| | Propofol | 50 | 87.1733 | 8.13108 | 1.14991 | | | | |

The following table shows the t-test results of MAP. The results have been reported assuming equal variances. Significant is fixed at 0.05.

Table 10: Independent samples t-test

| | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---------|---|------|------------------------------|----|-----------------|-----------------|---|----------|--|
| | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | 95% Confidence Interval of the Difference | | |
| | | | | | | | Lower | Upper | |
| MAP PRE | .096 | .758 | -2.227 | 98 | <0.001 | -3.62000 | -6.84567 | -.39433 | |
| MAP IND | .713 | .400 | 8.814 | 98 | <0.001 | 10.96000 | 8.49233 | 13.42767 | |
| MAP INT | .356 | .552 | .828 | 98 | <0.001 | 1.78667 | -2.49658 | 6.06992 | |
| MAP 1 | 1.525 | .220 | 4.176 | 98 | <0.001 | 7.06000 | 3.70470 | 10.41530 | |
| MAP 3 | 3.396 | .068 | 3.603 | 98 | <0.001 | 5.97333 | 2.68304 | 9.26363 | |
| MAP 5 | 4.933 | .029 | -.027 | 98 | <0.001 | -.04667 | -3.53774 | 3.44441 | |
| MAP 10 | 3.192 | .077 | 2.087 | 98 | <0.001 | 3.01333 | .14740 | 5.87926 | |

The following tables show the Independent t-test among different groups Etomidate and Propofol and their variation in terms of systolic and diastolic blood pressure.

Table 11: Descriptive Statistics for systolic pressure

| GROUPS | N | Mean | Std. Deviation | Std. Error Mean | |
|---------|-----------|------|----------------|-----------------|-------|
| SYS PRE | Etomidate | 50 | 127.90 | 11.888 | 1.681 |
| | Propofol | 50 | 131.00 | 13.110 | 1.854 |
| SYS IND | Etomidate | 50 | 122.28 | 6.247 | .883 |
| | Propofol | 50 | 104.04 | 10.801 | 1.527 |
| SYS INT | Etomidate | 50 | 125.04 | 21.579 | 3.052 |

| | | | | | |
|---------|-----------|----|--------|--------|-------|
| INT | Propofol | 50 | 127.52 | 15.312 | 2.165 |
| SYS PRE | Etomidate | 50 | 121.76 | 11.605 | 1.641 |
| | Propofol | 50 | 111.26 | 20.316 | 2.873 |
| SYS IND | Etomidate | 50 | 121.44 | 10.412 | 1.473 |
| | Propofol | 50 | 108.80 | 12.627 | 1.786 |
| SYS INT | Etomidate | 50 | 123.84 | 15.733 | 2.225 |
| | Propofol | 50 | 123.14 | 12.805 | 1.811 |
| SYS 1 | Etomidate | 50 | 120.60 | 9.461 | 1.338 |
| | Propofol | 50 | 112.84 | 13.661 | 1.932 |

The following table shows the t-test results of systolic pressure. The results have been reported assuming equal variances. Significant is fixed at 0.05.

Table 12: Independent t-test for systolic pressure

| | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|---------|---|------|------------------------------|----|-----------------|-----------------|-----------------------|---|--------|
| | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | Lower | Upper |
| SYS PRE | .602 | .440 | -1.239 | 98 | <0.005 | -3.100 | 2.503 | -8.067 | 1.867 |
| SYS IND | 6.384 | .013 | 10.337 | 98 | <0.005 | 18.240 | 1.765 | 14.738 | 21.742 |
| SYS INT | .068 | .795 | -.663 | 98 | <0.005 | -2.480 | 3.742 | -9.906 | 4.946 |
| SYS 1 | 2.079 | .153 | 3.173 | 98 | <0.005 | 10.500 | 3.309 | 3.934 | 17.066 |
| SYS 3 | .653 | .421 | 5.461 | 98 | <0.005 | 12.640 | 2.314 | 8.047 | 17.233 |
| SYS 5 | 2.815 | .097 | .244 | 98 | <0.005 | .700 | 2.869 | -4.993 | 6.393 |
| SYS 10 | 1.443 | .233 | 3.302 | 98 | <0.005 | 7.760 | 2.350 | 3.096 | 12.424 |

The following tables show the descriptive statistics and t-test results of diastolic pressure. The results have been reported assuming equal variances. Significant is fixed at 0.05.

Table 13: Descriptive Statistics for diastolic pressure

| GROUPS | N | Mean | Std. Deviation | Std. Error Mean | |
|---------|-----------|------|----------------|-----------------|-------|
| DIA PRE | Etomidate | 50 | 78.40 | 7.741 | 1.095 |
| | Propofol | 50 | 82.28 | 7.396 | 1.046 |
| DIA IND | Etomidate | 50 | 76.64 | 4.615 | .653 |
| | Propofol | 50 | 69.32 | 6.598 | .933 |
| DIA INT | Etomidate | 50 | 80.10 | 6.707 | .949 |
| | Propofol | 50 | 80.72 | 9.459 | 1.338 |
| DIA 1 | Etomidate | 50 | 76.96 | 6.263 | .886 |
| | Propofol | 50 | 71.62 | 6.279 | .888 |
| DIA 3 | Etomidate | 50 | 74.54 | 7.723 | 1.092 |
| | Propofol | 50 | 71.90 | 9.715 | 1.374 |
| DIA 5 | Etomidate | 50 | 78.08 | 8.081 | 1.143 |
| | Propofol | 50 | 78.50 | 8.389 | 1.186 |
| DIA 10 | Etomidate | 50 | 74.98 | 6.592 | .932 |
| | Propofol | 50 | 74.34 | 7.221 | 1.021 |

The following table shows the t-test results of diastolic pressure. The results have been reported assuming equal variances. Significant is fixed at 0.05.

Table 14: Independent t-test for diastolic pressure

| | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
|--|---|------|------------------------------|----|-----------------|-----------------|-----------------------|---|-------|
| | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| | | | | | | | | Lower | Upper |

| | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
|---------|-------|------|--------|----|-----------------|-----------------|-----------------------|---|-------|
| | | | | | | | | Lower | Upper |
| DIA PRE | .971 | .327 | -2.563 | 98 | <0.005 | -3.880 | 1.514 | -6.885 | -.875 |
| DIA IND | .245 | .622 | 6.429 | 98 | <0.005 | 7.320 | 1.139 | 5.060 | 9.580 |
| DIA INT | 5.774 | .018 | -.378 | 98 | <0.005 | -.620 | 1.640 | -3.874 | 2.634 |
| DIA 1 | .054 | .816 | 4.258 | 98 | <0.005 | 5.340 | 1.254 | 2.851 | 7.829 |
| DIA 3 | 4.345 | .040 | 1.504 | 98 | <0.005 | 2.640 | 1.755 | -.843 | 6.123 |
| DIA 5 | .045 | .832 | -.255 | 98 | <0.005 | -.420 | 1.647 | -3.689 | 2.849 |
| DIA 10 | .339 | .562 | .463 | 98 | <0.005 | .640 | 1.383 | -2.104 | 3.384 |

Variations of heart rate, systolic and diastolic blood pressure and Mean arterial pressure at pre induction, post induction, at 1 minute, 3 minutes, 5 minutes and 10 minutes.

Heart rate

The following table shows the variation in heart rate between Etomidate and Propofol while the subsequent figure graphically represents the same.

Table 15: Heart rate variations

| | Etomidate | Propofol |
|----------|-----------|----------|
| Pre Ind | 88.16 | 92.70 |
| Post Ind | 83.92 | 73.68 |
| Post Int | 87.96 | 90.58 |
| 1 Min | 85.18 | 78.36 |
| 3 Mins | 84.84 | 75.90 |
| 5 Mins | 87.26 | 88.96 |
| 10 Mins | 75.96 | 83.08 |

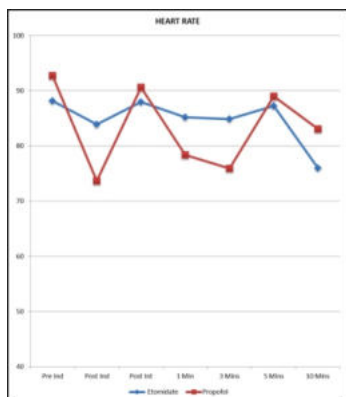


Figure 10: Heart rate variations

Systolic blood pressure

The following table shows the variation in systolic blood pressure between Etomidate and Propofol while the subsequent figure graphically represents the same.

Table 16: Systolic blood pressure variations

| | Etomidate | Propofol |
|----------|-----------|----------|
| Pre Ind | 127.90 | 131.00 |
| Post Ind | 122.28 | 104.04 |
| Post Int | 125.04 | 127.52 |
| 1 Min | 121.76 | 111.26 |
| 3 Mins | 121.44 | 108.80 |
| 5 Mins | 123.84 | 123.14 |
| 10 Mins | 120.60 | 112.84 |

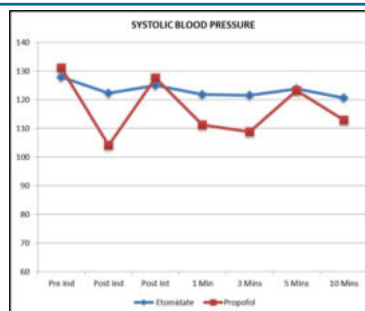


Figure 11: Systolic blood pressure variations

Diastolic blood pressure

The following table shows the variation in diastolic blood pressure between Etomidate and Propofol while the subsequent figure graphically represents the same.

Table 17: Diastolic blood pressure variations

| | Etomidate | Propofol |
|----------|-----------|----------|
| Pre Ind | 78.40 | 82.28 |
| Post Ind | 76.64 | 69.32 |
| Post Int | 80.10 | 80.72 |
| 1 Min | 76.96 | 71.62 |
| 3 Mins | 74.54 | 71.90 |
| 5 Mins | 78.08 | 78.50 |
| 10 Mins | 74.98 | 74.34 |

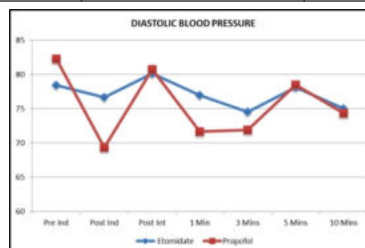


Figure 12: Diastolic blood pressure variations

Mean arterial pressure

The following table shows the variation in mean arterial pressure between Etomidate and Propofol while the subsequent figure graphically represents the same.

Table 18: Mean arterial pressure variations

| | Etomidate | Propofol |
|----------|-----------|----------|
| Pre Ind | 94.90 | 98.52 |
| Post Ind | 91.85 | 80.89 |
| Post Int | 96.30 | 94.51 |
| 1 Min | 91.89 | 84.83 |
| 3 Mins | 90.17 | 84.20 |
| 5 Mins | 93.33 | 93.38 |
| 10 Mins | 90.19 | 87.17 |

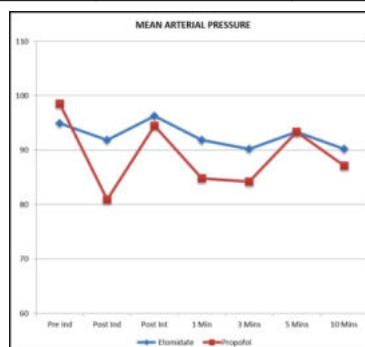


Figure 13: Mean arterial pressure variations Additional Induction Use

There were eight cases of rescue induction. The following table shows the details of patients given rescue induction.

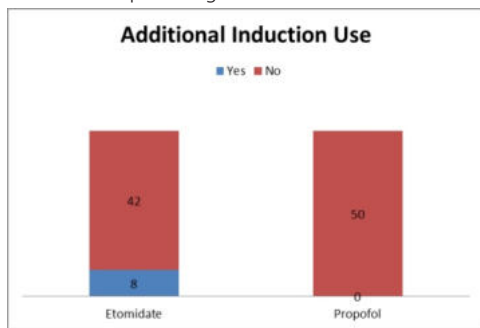


Figure 14: Additional Induction Use

Bradycardia

The following figure shows the results for bradycardia. The subsequent table shows chi-square test results. It was present in 10 subjects of the sample propofol.

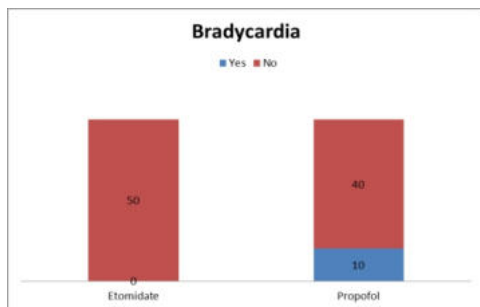


Figure 14: Bradycardia in patients

Chi-square test for independence

Table 20: Chi-square test for independence

| | Value | df | Sig |
|--------------------|--------|----|-------|
| Pearson Chi-Square | 11.111 | 1 | 0.001 |

The chi-square tests for independence shows a value of 11.111 with df=1 (p<0.05).

Hypotension

The following figure shows the results for hypotension. The subsequent table shows chi-square test results. It was present in 15 subjects of the sample propofol.

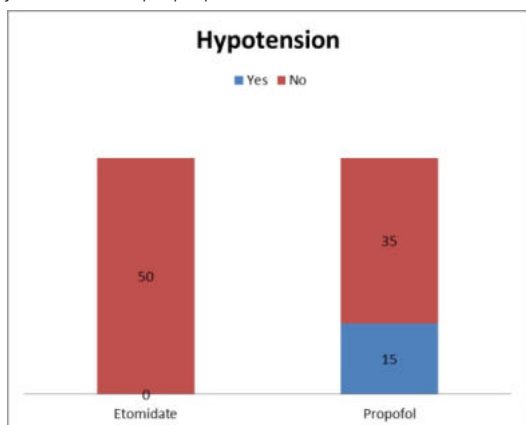


Figure 15: Hypotension in patients

Chi-square test for independence

Table 21: Chi-square test for independence

| | Value | df | Sig |
|--------------------|--------|----|-------|
| Pearson Chi-Square | 17.647 | 1 | 0.000 |

The chi-square tests for independence shows a value of 17.647 with df=1 (p<0.005).

Postoperative Nausea and Vomiting

The following figure shows the results for PONV. The subsequent table shows chi-square test results. It was present in 5 subjects of the sample Etomidate.

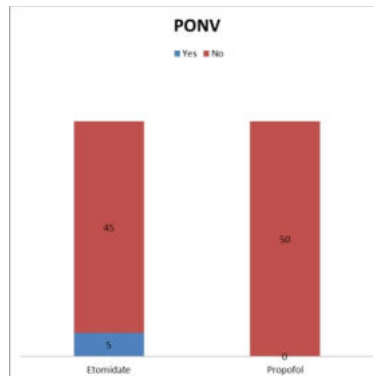


Figure 16: PONV in patients

Chi-square test for independence

Table 22: Chi-square test for independence

| | Value | df | Sig |
|--------------------|-------|----|-------|
| Pearson Chi-Square | 5.263 | 1 | 0.022 |

The chi-square tests for independence shows a value of 5.263 with df=1 (p<0.05).

Myoclonus

The following figure shows the results for myoclonus. The subsequent table shows chi-square test results. It was present in 9 subjects of the sample Etomidate.

Chi-square test for independence

Table 23: Chi-square test for independence

| | Value | df | Sig |
|--------------------|-------|----|-------|
| Pearson Chi-Square | 9.890 | 1 | 0.002 |

The chi-square tests for independence shows a value of 9.890 with df=1 (p<0.05).

DISCUSSION

There were 50 patients in both groups. Majority of them were in the age group of 31-40 years (52%, n=52). In the group that was administered Propofol, 56% of them were in the age group of 31-40 years while in Etomidate group, it was 48%. Both the groups were comparable in age wise distribution. Etomidate group had a higher age mean. Propofol group had a higher weight mean. Males were more in number (74%, n=74). The maximum number was males in Etomidate group (39). 78% of the sample in Etomidate and 70% of sample in Propofol were males. The chi-square test was statistically significant for finding out gender difference between groups. Majority of them (85%, n=85) were in the category I of ASA PS. Majority of them (44) were in the category I of Etomidate group. 88% of the sample in Etomidate and 82% of sample in Propofol were category I. Chi-square test results for ASA PS distribution among different groups were significant. The independent samples t-test were statistically significant and there was variation between Etomidate and Propofol groups that can be attributed to the anesthetic agents. In a study by Harris et al (1988)¹ on the effects of etomidate and propofol on the hemodynamic response to tracheal intubation revealed the following findings. The study was done among 303 patients induced with Etomidate 0.3mg/kg or Propofol 2.5 mg/kg showed that mean arterial pressure decreased after using propofol. In this study, it was concluded that induction with propofol is better to get an accentuated response¹. This is slight disagreement with our study where Etomidate gave better results

than Propofol. Another study that is different from the present is the randomized trial by James R et al in 2007 for using Etomidate or Propofol in Emergency department for procedural sedation showed that Etomidate has lower success². But this was not in equal groups. And randomisation may have caused the contamination in the statistics.

A study by Shagun et al in 2015³ to compare the hemodynamic effects of intravenous etomidate versus propofol during induction and intubation revealed that Etomidate provides more hemodynamic stability than propofol during induction and intubation. This is in agreement with our study that emphasizes that Etomidate is more preferred.

Another comparative study by Kavitha et al in 2016⁴ to understand the comparison between Etomidate and Propofol among ninety patients between the age group of 15 to 60 years of ASA PS I and II. The study concluded that the combination was better hemodynamically than either drug used alone. In the present study, however the combination of agents was not used.

Another study by Hosseinzadeh et al. in 2013⁵ was done to compare the hemodynamic changes while placing the LMA using etomidate-propofol combination, etomidate and propofol. The finding suggested that hemodynamics was more stable with group Etomidate than the other 2 groups. The present study also proves the same that Etomidate is better than Propofol.

Similarly, a study by Yagan Ö et al in 2015⁶ that etomidate was much better than propofol and the combination of the two agents were better at some parameters. Another study by Weiss-Bloom LJ et al in 1992⁷ showed that post anesthesia induction using etomidate (0.3 mg/kg) the ideal dose of fentanyl was 5-10 mg/kg to diminish the hemodynamic response to laryngoscopy and intubation. Muriel et al. in 1991⁸ reported that systolic, diastolic blood pressure and heart rate was elevated in the group given Etomidate. Schmidt et al in 1999⁹ reported that reduction of the preload and afterload of the heart, caused by Propofol, lead to asynchronisation with the compensatory mechanisms of the heart. Mehrdad et al in 2012¹⁰ studied patients in two groups for elective orthopaedic surgeries and Etomidate was concluded to be a better agent when it comes to hemodynamic instability. Möller et al. in 2013¹¹ did a study to say that the hemodynamic stability was better in the group given Etomidate till seven minutes after intubation. Sawano et al in 2013¹² showed that adrenal suppression post administering single dose Etomidate is unimportant clinically.

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