



CLINICAL ANALYSIS OF ETOMIDATE OR THIOPENTONE AS INDUCTION AGENTS IN PATIENTS UNDERGOING CARDIAC SURGERY

Dr Jyoti Kumar Sinha	MD, Dept of Anesthesiology, Command Hospital Kolkata, West Bengal, India
Dr Shalendra Singh	DM, Dept of Anaesthesia and Critical Care, Armed Forces Medical College, PUNE, India
Dr Ashok Mohanty*	MD, Dept of Anesthesiology, Command Hospital Kolkata, West Bengal, India *Corresponding Author
Dr Priya Taank	MS, Department of Ophthalmology, CH(SC), PUNE, India

ABSTRACT

Background: Off- pump coronary artery bypass (OPCAB) surgery performed on beating heart results in wide variations in haemodynamics. The goal for anaesthesia is prevention of haemodynamic perturbation. This study has been carried out to assess the haemodynamic variability of two commonly used induction agents for elective OPCAB surgery.

Methods: Group A (n=30) and group B (n=30) patient received either etomidate 0.2mg/kg or thiopentone 2-4mg / kg IV for induction. Various haemodynamic parameters were recorded at T1 – baseline, T1, T2, T3, T5 at 1, 2, 3 and 5 minute post intubation respectively.

Results: The haemodynamic parameters were higher in immediate post intubation period in both groups. However both the groups showed similar haemodynamic changes.

Conclusion: This study demonstrates used of etomidate confers no additional benefits as compared to Thiopentone.

KEYWORDS : Etomidate, Thiopentone, Midazolam, OPCAB surgery.

INTRODUCTION

Off- pump coronary artery bypass (OPCAB) surgery are complicated cardiac procedures performed on beating heart. This involves considerable cardiac instability with wide variations in haemodynamics. [1] The most important anaesthetic considerations are the prevention of haemodynamic instability and ischaemia. [2, 3] Most of the anaesthetic agents cause significant change in haemodynamics so a balanced anaesthetic technique using limited and optimum doses are preferred.[4] This study has been carried out to assess the haemodynamic variability of two different co-induction agents in elective OPCAB surgery.

MATERIALS AND METHODS

The study was conducted at a tertiary care hospital after taking written and informed consent. A prospective, randomized study was conducted after hospital ethics committee clearance in ASA status II-IV, 35-70 years of age. Patients who are critically ill or haemodynamically unstable, immunocompromised, coronary artery disease with mitral regurgitation, left main coronary disease and severe left ventricular dysfunction have been excluded from the study.

Under local anaesthesia, right femoral artery and right internal jugular vein cannulated and connected to Flotrac catheter and Vigileo system. A reading of Invasive blood pressure (IBP), Heart rate (HR), Cardiac output (CO), Cardiac index (CI), Stroke volume (SV), Pulmonary artery pressure (PAP), Pulmonary artery wedge pressure (PAWP) and Systemic vascular resistance (SVR) were recorded at baseline. Patients received Inj midazolam 0.05- 0.1 mg/kg, Inj fentanyl 2-3 mcg / kg as pre induction. Patients were induced with Inj Etomidate 0.2- 0.3 mg/ kg (group A) or Inj Thiopentone 2-4mg / kg (group B) and intubated with Inj vecuronium 0.1mg/kg using. Anaesthesia was maintained with a standard institutional protocol. All the above parameters were recorded at (T1 – baseline, T1, T2, T3, T5 at 1, 2, 3 and 5 minute post intubation respectively).

The statistical analysis was done using SPSS (Statistical Package for Social Sciences) Version 15.0 statistical Analysis Software. The values were represented in Number (%) and Mean \pm SD. Student 't' test was used to test the significance of two means. The comparison between groups was done using chi – square test. Values at different time intervals were compared by paired 't' test.

RESULTS

60 patients undergoing elective cardiac surgery of either gender were included. Demographic profile of patients is comparable (Table 1).

Table 1: Demographic profile of the patients

Patient data	Group A (n=30) mean \pm SD	Group B (n=30) mean \pm SD	P value
Age	55.4 \pm 5.7	58.3 \pm 7	0.08
Female: Male	1:6.5	1:4	0.48
Weight (kg)	63.10 \pm 8.17	61.33 \pm 6.35	0.35
Baseline HR	73.80 \pm 11.4	72.33 \pm 11.7	0.62
MAP (mm Hg)	101.73 \pm 6.5	100.30 \pm 12.1	0.572

#HR-Heart rate, MAP-mean arterial pressure

Table 2. Systemic hemodynamic parameters at different time interval (values expressed as mean \pm SD or number) during 10 min observation period in two groups

value		T1	T2	T3	T4	T5
HR	Group A	72.33 \pm 11.78	62.97 \pm 11.79	84.97 \pm 13.88	76.33 \pm 13.43	73.13 \pm 12.21
	Group B	73.80 \pm 11.40	58.47 \pm 6.47	88.33 \pm 16.77	80.17 \pm 12.76	74.60 \pm 11.38
P value		0.626	0.07	0.40	0.26	0.63
MAP	Group A	100.3 \pm 12.18	85.5 \pm 8.39	114.8 \pm 18.00	98.7 \pm 14.01	90.7 \pm 9.50
	Group B	101.7 \pm 6.52	83.5 \pm 9.57	108.67 \pm 15.59	91.8 \pm 6.84	84 \pm 6.62
P value		0.57	0.40	0.16	0.02	0.00
PAWP (mm Hg)	Group A	14.4 \pm 2.37	13 \pm 1.34	15.2 \pm 1.79	15.3 \pm 2.83	14 \pm 2.15
	Group B	14.1 \pm 1.74	13 \pm 2.44	14.9 \pm 3.28	13.8 \pm 1.95	11.8 \pm 2
P value		0.53	0.94	0.62	0.01	0.001
SV (mmHg)	Group A	84.4 \pm 16.2	72 \pm 11.7	92.5 \pm 22.7	80.9 \pm 12.5	77.3 \pm 10.9
	Group B	79.6 \pm 12.63	69.9 \pm 9.5	87.5 \pm 13.3	77 \pm 10.7	72.7 \pm 7.9
P Value		0.20	0.45	0.30	0.21	0.06

CI (L/min/m ²)	Group A	3.7± 1.0	2.7± 0.5	4.7± 1.2	3.7± 0.9	3.4± 0.8
	Group B	3.6± 0.8	2.5± 0.3	4.8± 1.3	3.8± 0.9	3.3± 0.7
P value		0.75	0.16	0.80	0.48	0.70
Systolic PAP (mm Hg)	Group A	34.8± 6.9	28± 4.7	39.3± 7.2	32.4± 5.9	29.9± 4.4
	Group B	37.3± 8.1	29.2± 5.9	40.2± 9.1	35± 6	30± 6.3
P value		0.20	0.38	0.66	0.10	0.96
Mean SVR (dynes/cm ⁵)	Group A	1291±3 32	1430±3 03	1058±2 85	1103±2 86	1119±2 41
	Group B	1234±2 70	1365±2 50	1094±2 97	1157±2 62	1142±1 94
P value		0.47	0.37	0.63	0.45	0.69

#T1- Baseline,T2- Post induction,T3- Post intubation,T4-3 min post-intubation,T5-5 min post-intubation,CI- cardiac index, SVR-systemic vascular resistance, PAP-pulmonary arterial pressure. PAWP- pulmonary arterial wedge Pressure,HR-Heart rate, MAP-mean arterial pressure

HR in both the groups does not show any significant difference at any time interval. In Group A the change in MAP from baseline was significant at all time intervals except at T5. In Group B the change in MAP from baseline was significant at T2 and T3. Mean MAP values at all time intervals was higher in Group A than in Group B. Difference in PAWP in both the groups was significant at T4 and T5. At T2 in Group A, mean PAWP decreased from baseline. Thereafter it increased at T4 and T5 time intervals and crossed the baseline, this increase was significant. At T5 PAWP values decreased and was lower than baseline, this change from baseline was statistically non significant. In Group B, mean PAWP decreased from baseline at T2 this change was significant ($p<0.001$) (Table 2). At T5 the decrease in PAWP (from baseline) was statistically significant. At all time intervals SV values were higher in Group A than in Group B (Table 2). At all time intervals, there was no significant difference in values of CO of Group A and Group B. Mean CI (L/min/m²) values of both the group at different time intervals showed no statistically significant difference. (Table 2) Mean Systolic PAP (mm Hg) and SVR values of both the group at different time intervals showed no statistically significant difference. Mean SVR values of both the group at different time intervals showed no significant difference. (Table 2)

DISCUSSION

Off pump coronary artery bypass surgery (OPCAB) is currently the most common cardiac surgery performed across various cardiac centers. In a comparative study of etomidate and thiopental anesthesia in cardioversion by Steven R Ford et al etomidate caused slight fall in HR while thiopentone caused mild increase in HR. [5,6] SV were higher in etomidate group at all times than in thiopentone group. Minimum values of CI were recorded at post induction time in both groups and maximum values were observed at post intubation in both groups. This observation was consistent with observations on CO and SV since both showed a similar trend at post induction and post intubation. Raveen Singh et al and Joerg Tarnow et al respectively have demonstrated a mild decrease in CO and CI with the use of either etomidate or Thiopentone. [7] Between the two groups mean PAP value changes were significant at post induction and post intubation period. This result was consistent with other studies which showed no significant change in PAP with either etomidate or Thiopentone. Joerg Tarnow et al in his study observed no major change in PAWP or SVR with either Etomidate or Thiopentone. [7]

CONCLUSION

To conclude, this study demonstrates Etomidate confers no additional benefits as compared to Thiopentone. So, either of the two can safely be used for induction in OPCAB surgery.

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