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COINDUCTION OF DEXMEDETOMIDINE WITH PROPOFOL –HAEMODYNAMIC CHANGES IN HYPERTENSIVE PATIENTS

Anaesthesiology

KEYWORDS: Coinduction, haemodynamic stability, dexmedetomidine, propofol sparing effect

Dr Madhu Velayudhen — MD, Associate professor, Department of Anaesthesiology, Sree Gokulam medical college and research foundation, Venjaramoodu, Thiruvananthapuram, Kerala-695607

Dr Vinod Kumar Sudevan — Junior resident intern, Department of Anaesthesiology, Sree Gokulam medical college and research foundation.

Dr.T.P.Madhusoodanan — MD, Professor, Department of Anaesthesiology, Sree Gokulam medical college and research foundation.

ABSTRACT

Background and aims: Coinduction of propofol with dexmedetomidine and its effect on hemodynamics during induction and its propofol sparing effect in hypertensive patients.

Methods: Prospective randomised study, patients posted for elective surgery. Coinduction of dexmedetomidine (0.2 µg/kg IV)bolus over 1 minute and propofol in study group, propofol alone in control group. Hemodynamics during the first 10 minutes and propofol requirement are recorded.

Results: During induction and intubation, the change in BP and heart rate were significantly reduced with coinduction. There was a reduction of propofol requirement by 15-20%.

Conclusion: The result of the study showed that co induction with dexmedetomidine at 0.2 µg/kg IV produced a much more stable haemodynamic status and also had reduced stress during intubation, also reducing the dose of propofol required to induce.

INTRODUCTION

In general anaesthesia one of the major challenges during intubation is to keep the stress levels of the patient to minimum. Intubation is usually associated with increase in heart rate and mean arterial pressures. Sometimes the rise in heart rate and pressures are minimal, which is acceptable. In cases where sudden rise in pressures or heart rates, as in neurosurgical or CAD patients, this becomes a challenge.

Dexmedetomidine is a novel highly selective α2-adrenoreceptor agonist,which is used for ICU sedation,procedural sedation along with monitored anaesthesia care. It has also been shown to have an analgesic as well as anaesthetic sparing effect.In combination with propofol, dexmedetomidine has been demonstrated to assist in extubation, fiberoptic intubation, awake blind nasotracheal intubation, LMA placement and intubation without muscle relaxants [9-16].

Hypertension is a common coexisting diseases in surgical population. Hypertension raises several concerns, including the propensity to have more difficult hemodynamic control during anaesthesia, a perceived risk of increased intraoperative and postoperative cardiovascular events, difficulties with blood pressure management immediately after the procedure, and the fact that hypertension is a risk factor for the presence of other cardiovascular diseases that may be silent.

Therefore we conducted this study to describe the hemodynamic effects of dexmedetomidine in propofol based general anaesthesia and its propofol sparing effect.

OBJECTIVE

To study the haemodynamic response on co induction with calculated dose of intravenous dexmedetomidine and propofol for induction in hypertensive patients.

MATERIAL AND METHOD:

STUDY DESIGN:

Randomised control study

STUDY SETTING:

Department of Anaesthesiology, Sree Gokulam Medical College and Research Foundation.

STUDY POPULATION:

Patients with hypertension, belonging to ASA 2 and 3, age 30-70yrs who are posted for surgery in, Sree Gokulam Medical College and Research foundation.

Parameter	Group C (n=25)	Group D (n=25)	P value
Age (yr)	49 + 10	52 + 11	0.55
Height (cm)	162 + 6	156 + 7	0.06
Weight (kg)	59.9 + 5.8	55.7 + 5.6	0.11
BSA (m^2)	1.65 + 0.11	1.56 + 0.10	0.07

Table 1: Demographic comparison

The values are expressed as means + SD. P values determined by a t-test. C: propofol, D: propofol-dexmedetomidine, BSA: body surface area.

INCLUSION CRITERIA:

- Patients with systemic hypertension
- No allergy or contraindications to any of the study drugs
- Correctly administrated premedication
- No systemic infections

EXCLUSION CRITERIA:

- Severe liver, renal or cardiac disease
- Allergy or contraindications to any of the study drugs
- Incorrectly administrated premedication
- Systemic infections

SAMPLE SIZE:

Total sample size of 50 patients, 25 in each study group.

STUDY PERIOD:

August 2014-July 2015, a period of 11 months.

METHODOLOGY:

After getting approval from the institutionalethical committee and getting written informed consent from the selected patients, regular overnight nil per oral and morning dose of anti hypertensives were given, prospective, randomised, double-blind study was conducted by way of closed envelope system.Monitors used were non-invasive

BP,pulse oximetry,ECG along with IBP on the right radial artery under LA.. All patients were randomly allotted using block randomisation to either a Control (C) or the trial group (D).

Premedicatedwith Inj Midazolam (0.05 mg/kg IV), antiemetic Inj Ondansetron 4mg IV, and an antisialagogue Inj Glycopyrrolate (10 µg/kg IV).

In the study group (D), induction was done by giving Inj Dexmedetomidine at 0.2 µg/kg IV bolus over 1 minute followed by Inj Propofol, end point being loss of verbal response.

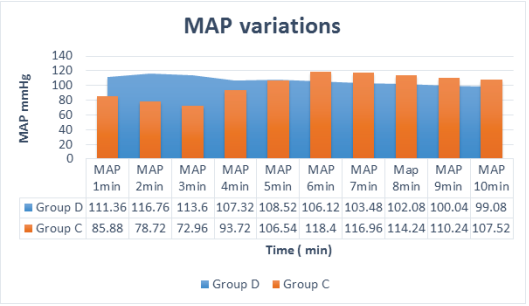
In the control group(C), induction is done by giving a titrated dose of Inj Propofol, end point being loss of verbal response. This was followed byInj Vecuronium at 0.1mg/kg and intubation is done at 3 min in both groups after giving1/3rd of induction dose of propofol.

The IBP is monitored continuously and readingswere recorded every minute for 10 minutes from the starting of induction. The stress response during intubation are noted. Hypotension(MAP less than 65mmHg) was treated with mephenteramine IV 3-6mg. Bradycardia(HR less than 45 beats per minute)was treated with IV glycopyrrolate 0.2mg.

DATA ANALYSIS:

The data collected entered in MS excel and analyzed using SPSS software ver 20.0.0.All qualitative variables expressed as % and quantitative using mean and standard deviation.Data analysed with student t test and SPSS software and was used for all statistical analyses. P value of <0.005 was considered significant.

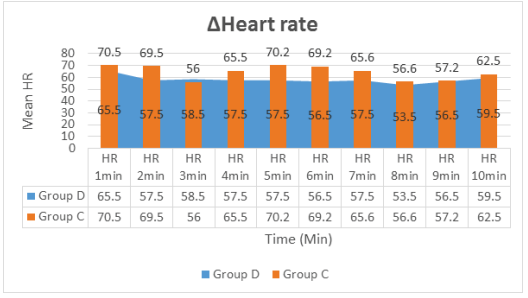
RESULTS:



Graph 1: MAP variations

ΔMAP

The changes in MAP% at induction and intubation in group D (+11.0 + 3.6% and +10.4 + 3.9% respectively) were significantly less than those in group C (-24.6 + 11.4% and -22.6+18.4% respectively).



Graph 2: Change in heart rates

The HRs on induction, were significantly lower in group D ($P < 0.05$) than that in group C. The HRs at intubation were significantly lower in group D than that in group C ($P < 0.05$).The propofol dose required was significantly lower in group D than in group C (1.78 + 0.25 µg /kg vs 2.46 + 0.42 µg/kg; $P<0.001$).

Group D had better haemodynamic stability with minimal variation from baseline MAP, a range of 10-15mmHg.Group C had a varied range of MAP with profound drop during initial minutes of induction, sometimes requiring vasopressors support.

Dose requirement of propofol was reduced by 15-20% on co induction with dexmedetomidine.

DISCUSSION:

Dexmedetomidine is 1600 times more selective to α-2 receptors than to α-1 receptors (clonidine, 200:1), and this high selectivity contributes to increases in hypnotic and analgesic efficacies and decreases in cardiovascular side effects [22-23]. Dexmedetomidine has also been shown to alleviate propofol injection pain. [24]

Hypertension is one of the most common concomitant disease that we encounter in the practice of anaesthesia. In hypertensive patients, excessive reduction in blood pressure is observed after anaesthetic induction, while excessive increases in blood pressure are seen under stresses such as intubation, laryngoscopy, surgical incision and extubation. A decrease of greater than 20% in blood pressure can precipitates myocardial ischemia; decreases in diastolic blood pressure in particular can cause declines in both cerebral and myocardial perfusion. Elevations in blood pressure may cause myocardial ischemia and infarction by increasing cardiac work. Perioperative and postoperative complications in hypertensive patients are similar to those in normotensive patients [17-21]. So in certain cases it is pertinent to have a relatively stable blood pressure levels even from induction phase.

Dexmedetomidine causes an initial hypertensive response followed by a sustained hypotensive response along with decrease in heart rate.This is mediated via its action through central as well as peripheral alpha 2 receptors. The hypertensive response is marked with larger initial doses of dexmeditomidine.Dexmedetomidine has also been shown to reduce pain of injection of propofol.

We studied the effect of dexmedetomidine with propofol and its haemodynamic effects and found that the dose requirement of propofol was reduced by 15-20% on co induction with dexmedetomidine. Group D had better haemodynamic stability with minimal variation from baseline MAP, a range of 10-15mmHg.Group C had a varied range of MAP with profound drop during initial minutes of induction, sometimes requiring vasopressors support. This result was probably due to the dominant hemodynamic effect of dexmedetomidine through postsynaptic α2B-mediated vasoconstriction

The reduced propofol dosage due to the adjuvant dexmedetomidine that might have contributed to less of a propofol-induced vasodilatory effect in group D.

CONCLUSION:

The result of the study showed that co induction with dexmedetomidine produced a much more stable haemodynamic status and also had reduced stress during intubation.

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