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EFFICACY OF DEXMEDETOMIDINE AND ESMOLOL IN ATTENUATION OF PRESSOR RESPONSE DURING LARYNGOSCOPY AND ENDOTRACHEAL INTUBATION

Anaesthesiology

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ABSTRACT

Backgound: Laryngoscopy and endotracheal intubation are very essential tools in the hands of anaesthesiologists in maintaining the airway. They are associated with rise in heart rate and blood pressure .Many strategies have been advocated to attenuate the hemodynamic response to laryngoscopy and endotracheal intubation. Dexmedetomidine, a centrally acting alpha 2 agonist, provides anxiolysis and cooperative sedation without respiratoy depression. Esmolol a cardioselective betablocker, with no significant intrinsic sympathomimetic acticity,produces reduction in heart rate and blood pressure.

Objective: To study the efficacy of i.v Dexmedetomidine and i.v esmolol in attenuating the pressor response during laryngoscopy and intubation.

Methodology: 60 Adult ASA 1 and ASA 2 point of both sexes and age between 20-50 years were included in the study .

They were divided into two groups:

Group **D**- 1mcg/kg of Dexmedetomidine diluted in 100ml 0.9%NS over 10 min given 10 min before induction.

Group **E**- 1.5mg/kg of Esmolol diluted in 10ml NS given 2 min before induction of anaesthesia.

Results: Dexmedetomidine 1mcg/kg is a better alternative for suppressing pressor response to laryngoscopy and endotracheal intubation in patients posted for elective surgery under general anaesthesia.

Dexmedetomidine was not associated with cardiovascular side effects like change in heart rate and rhythm, respiratory depression and was a better alternative to Esmolol in suppressing pressor response.

Conclusion: It can be concluded by the present comparative and statistically significant results that Dexmedetomidine is a better alternative to Esmolol for suppressing pressor response to laryngoscopy and endotracheal intubation in patients posted for elective surgery under general anaesthesia.

KEYWORDS

: Dexmedetomidine, Esmolol, laryngoscopy and intubation

Introduction:

Endotracheal intubation has become an integral part of the anaesthetic management and critical care of the patient. Laryngoscopy and tracheal intubation induced pressor responses have been associated with increase in catecholamine levels. Many strategies have been advocated to minimise the hemodynamic adverse responses aimed at different levels of reflex arc. No single drug or technique is satisfactory. Among the recommended procedures I.V lignocaine, Fentanyl, Esmolol, Midazolam and Dexmedetomidine appear to blunt the sympathetic response to laryngoscopy and intubation. Dexmedetomdine, a centrally acting alpha 2 agonist has been constantly associated with control of pressor response to laryngoscopy and intubation.

Aim & Objective:

The study of administration of I.V .Dexmedetomidine versus administration of I.V .Esmolol before laryngoscopy and tracheal intubation has following objectives.

1) To observe the variations in sympathetic response to laryngoscopy and intubation without measures to attenuate sympathetic response.
2) To study the effectiveness of

a) I .V. Dexmedetomidine 1mcg/kg diluted in 100 ml of 0.9%NS administered 10 min before induction and

B) I.V.Esmolol 1 .5mg/kg. Diluted in 10ml of 0.9% NS administered 2 minutes before induction in attenuating the sympathetic response during laryngoscopy and intubation.

METHODS:

60 Adult ASA 1 and ASA 2 point of both sexes and age between 20-50 years were included in the study. Patients were selected from ENT and General surgery departments posted for elective surgeries like tympanoplasty, modified radical mastoidectomy, laporoscopic cholecystectomy 10 in each group under GA

60 cases were divided into two groups.

Group **D**- Dexmedetomidine group: In this group 1mcg/kg of Dexmedetomidine diluted in 100mL 0.9%NS over 10 min given 10 min before induction of anaesthesia.

Group **E**- Esmolol group: In this group 1.5mg/kg of Esmolol diluted in 10mL NS was given 2minutes before induction of anesthesia.

Premedication:

All the Patients were visited the day before surgery and preanaesthetic counselling was done. All patients received Alprazolam 0.5mg orally night on day before surgery.

On the day of surgery intravenous line was secured with 18G cannula and following premedication were given 15 minutes before induction.

Inj. Ondansetron 0.1mg/kg IV
Inj. Ranitidine 1mg/kg IV

Patients were monitored by pulse oximeter, noninvasive blood pressure and ECG monitors. A preinduction heart rate, systolic, diastolic & mean blood pressures were recorded. IV infusion of RL solution was started.

Materials:

1. Laryngoscope
2. 100ml NS
3. Dexmedetomidine
4. Esmolol

Anaesthetic technique:

In Group D Dexmedetomidine in a dose of 1mcg/kg in 100ml 0.9%NS was given as a bolus dose over 10minutes. Induction was started 10 minutes after Dexmedetomidine was stopped. All patients were preoxygenated with 100%oxygen for 3min before induction. In Group E, Esmolol 1.5mg/kg diluted in 10mL NS was given 2minutes before induction of anaesthesia. Induction was achieved with Inj. Thiopentone sodium 5mg/kg I V given in 2.5%solution.

After induction of anaesthesia (loss of eyelash reflex), heart rate,

systolic and diastolic blood pressures were recorded. Succinylcholine was administered at a dose of 2mg/kg IV. Laryngoscopy was done using rigid laryngoscope with standard MacIntosh blade. Intubation was done with appropriate sized disposable, high volume low pressure cuffed endotracheal tube. Oral intubation was done within 15 to 20 seconds. Patients were connected with closed circuit with a circle absorber. HR, SBP, DBP &MAP were recorded after study drug administration, after induction, immediately after laryngoscopy and intubation and at time intervals 1min, 3min, 6min and 9min from the onset of intubation.

Anaesthesia was maintained with nitrous oxide (67%), oxygen (33%) & Sevoflurane 1%. Nondepolarising muscle relaxant vecuronium bromide was used in a dose of 0.08mg per kg body weight in all cases. Throughout the surgery, saturation was maintained at 100%.Surgery was not allowed till the study was completed. At the end of surgery patients were reversed with injection neostigmine 0.05 mg per kg bodyweight and injection atropine 0.02 mg per kg body weight.

MONITORING:

a) Blood pressure:- Systolic, Diastolic & mean arterial pressure. b) Heart rate. c) Oxygen saturation d) Continuous ECG monitoring (limb lead-II). e) Adequacy of ventilation monitored clinically

OBSERVATION AND RESULTS :

From the study conducted the following observations regarding HR, SBP, DBP& MAP were measured at following time periods:-

Preinduction (basal value)
After study drug administration (Dexmedetomidine & Esmolol)
After induction.

Immediately after Laryngoscopy and intubation.
1 minute after intubation.
3minutes after intubation.
6 minutes after intubation .
9minutes after intubation

DISCUSSION :

In the present study,60 patients with ASA 1 and ASA 2 between age group 20-50 years were selected and posted for surgery under general anaesthesia and were divided into two groups.

Group **D**- Dexmedetomidine group: In this group 1mcg/kg of Dexmedetomidine diluted in 100mL 0.9%NS over 10min given 10 min before induction of anaesthesia.

Group **E**- Esmolol group. In this group 1.5mg/kg of Esmolol diluted in 10mL NS was given 2minutes before induction of anesthesia.

The parameters measured in the two groups include a)Blood pressure:- Systolic, Diastolic & mean arterial pressure. b) Heart rate. c) Oxygen saturation d) Continuous ECG monitoring (limb lead-II). e) Adequacy of ventilation monitored clinically.

The demographic data compared the two groups were age, height, weight, sex. The differences in the mean values of these parameters were not statistically significant(P>0.05) among the two groups.

Table-1: Heart Rate at Various Points of Time during the Period of Observation

HR (in bpm)	Group D		Group E		P-value
	Mean	SD	Mean	SD	
Base line	84.40	12.82	86.40	10.56	0.51
At Study Drug	81.73	11.74	85.07	10.78	0.07
After induction	81.27	11.80	81.87	9.28	0.83
Immediate intubation	78.83	11.41	91.43	10.33	<0.01
1 min	77.73	11.85	92.27	10.26	<0.01
3 min	74.07	10.74	88.07	9.16	<0.01
6 min	71.07	10.26	86.37	8.46	<0.01
9 min	67.37	9.03	87.10	8.84	<0.01

In the present study, there is a slight fall in heart rate from the baseline values in the two groups. The fall in heart rate from the baseline in group D was more when compared with group E, but the difference was statistically insignificant. There was gradual fall in heart rate in group D when compared to baseline at 1 min,3 min,6min,9min did not reach the base line during the period of study. Whereas in Group E, heart rate showed significant rise after immediate intubation and at 1min,3min,6min,9min.

Table-2: Systolic Blood Pressures at various intervals

SBP (in mm Hg)	Group D		Group E		P-value
	Mean	SD	Mean	SD	
Base line	122.87	17.48	127.97	9.63	0.17
After Study Drug	120.00	15.05	126.07	10.28	0.07
After induction	116.70	17.84	117.87	11.19	0.76
Immediate intubation	115.47	15.54	134.57	8.18	<0.01
1 min	112.50	15.00	135.67	8.26	<0.01
3 min	106.83	12.55	128.27	7.59	<0.01
6 min	102.03	11.88	126.03	8.16	<0.01
9 min	98.87	10.13	126.97	9.15	<0.01

IN Group D there was a gradual fall in systolic blood pressure after intubation and reached baseline 30 min after intubation. Where as in Group E SBP increased immediately after intubation, thereafter it decreased and reached baseline at 6min after intubation.

Table-3 : Diastolic Blood pressure at various intervals

DBP (in mm Hg)	Group D		Group E		P-value
	Mean	SD	Mean	SD	
Base line	76.60	12.53	81.33	5.31	0.07
After Study Drug	73.27	9.99	81.97	10.28	0.07
After induction	71.20	11.59	76.90	5.11	<0.01
Immediate intubation	70.03	11.65	88.87	6.58	<0.01
1 min	69.17	11.78	88.87	5.67	<0.01
3 min	66.30	9.44	81.13	5.18	<0.01
6 min	62.73	10.05	80.63	5.21	<0.01
9 min	59.93	9.07	78.70	5.44	<0.01

After induction the fall in diastolic BP was significant in Group D when compared to Group E, DBP reached baseline at 30min after intubation in Group D &6min after intubation in Group E

There was statistically significant decrease in Mean arterial pressure in Group D, when compared to Group E after intubation. MAP reached baseline at 9 min and 30 min after intubation in Group E and Group D respectively.

Bachofen M stated the criteria for selection of appropriate drug to prevent sympathetic response. The drug must prevent impairment of cerebral blood flow and avoid arousal of patients. It should neither be time consuming nor effect the duration and modality of ensuing anaesthesia. Dexmedetomidine and Esmolol seem to be satisfying the above stated criteria.This study is aimed at assessing the efficacy of both the drugs in attenuating the hemodynamic response to laryngoscopy and intubation. The present prospective study was undertaken to compare efficacy of IV Dexmedetomidine and IV Esmolol in attenuating the pressor response to laryngoscopy and intubation with respect to increase in HR, SBP, DBP and MAP after intubation. The study population consists of 60patients divided into two groups randomly. Group D consisted of 30 patients in whom 1mcg/kg IV

Dexmedetomidine mixed in 100 ml of 0.9% NS infused over 10minutes ,given 10minutes before intubation and Group E consisted of 30 patients who received IV Esmolol 1.5mg/kg diluted in 10mL 0.9% NS given 2minutes before induction.

RESULTS :

vital parameters were stable and attenuation of pressor response to laryngoscopy and endotracheal intubation with Dexmedetomidine 1mcg/kg was effective when compared to Esmolol 1.5mg/kg. Hemodynamics were stable throughout the period of study with Dexmedetomidine. There was significant rise in vital parameters after intubation with Esmolol above baseline

CONCLUSION:

a) From the present study it can be concluded that compared to Esmolol 1.5mg/kg, Dexmedetomidine1mcg/kg is a better alternative for suppressing pressor response to laryngoscopy and endotracheal intubation in patients posted for elective surgery under general anaesthesia.
b) Dexmedetomidine was not associated with cardiovascular sideeffects like change in heart rate and rhythm, respiratory depression and hence can be a better alternative to Esmolol in suppressing pressor response.

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