ORIGINAL RESEARCH

Effect of esmolol & dexmedetomidine in attenuating hemodynamic response to laryngoscopy and endotracheal intubation

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ABSTRACT

Background: The best method for controlling the airway before surgery is endotracheal intubation. The present study was conducted to evaluate the effect of esmolol & dexmedetomidine in attenuating hemodynamic response to laryngoscopy and endotracheal intubation. **Materials & Methods:** 75 adult patients selected for elective surgery under general anaesthesia. In group I patients, 10 ml normal saline was administered 5 minutes before laryngoscopy and intubation. In group II patients, 0.5 mg/kg esmolol IV diluted to 10 ml with distilled water, 5 minutes before laryngoscopy and intubation was used. In group III, patients received 0.5µ/kg of dexmedetomidine IV diluted with distilled water to make 10 ml, 5 minutes before laryngoscopy and intubation. Parameters such as duration of laryngoscopy, HR, SBP, DBP, MAP, RPP, RSS, VAS and dose of propofol was recorded. **Results:** Age group 21-30 years comprised of 4 patients in group I, 5 in group II and 6 in group III, age group 31-40 years had 6, 7 and 6, 41-50 years had 7, 6 and 8 and 51-60 years had 8, 7 and 5 patients respectively. RPP was 114.2 mmHg/min X 100, 114.2 mmHg/min X 100 and 116.4 mmHg/min X 100, dose of propofol was 102.6, 104.2 and 78.5, RSS was 2.5, 2.2 and 2.9 and VAS was 4.9, 4.1 and 2.9, duration of laryngoscopy was 10.5 minutes, 10.6 minutes and 10.3 minutes, HR (BPM) was 89.2, 89.4 and 86.2, SBP was 131.6 mm Hg, 130.3 mm Hg and 126.5 mm Hg, DBP was 80.5 mm Hg, 81.2 mm Hg and 82.0 mm Hg and MAP was 97.5 mm Hg, 98.3 mm Hg and 99.2 mm Hg in group I, II and III respectively. The difference was non- significant (P> 0.05). **Conclusion:** During the intraoperative period, intravenous dexmedetomidine preserves haemodynamic stability while reducing the stress reaction to laryngoscopy and intubation. The haemodynamic reaction to laryngoscopy and intubation was more successfully suppressed by dexmedetomidine 0.5 mcg/kg, and intraoperative hemodynamic parameters were kept more constant.

Key words: dexmedetomidine, tracheal intubation, haemodynamic

INTRODUCTION

The best method for controlling the airway before surgery is endotracheal intubation. However, endotracheal intubation and laryngoscopy both cause a noticeable sympathetic reaction that results in tachycardia and hypertension.[1] The frequency of myocardial ischemia and other consequences in patients with cardiovascular disease may increase significantly as a result of hemodynamic value fluctuations.[2] Numerous pharmacological and physiological preventive strategies have been explored to control the rise in these hemodynamic parameters. However, those actions might have some unintended consequences. So, finding the ideal solution is still a work in progress.[3]

To lessen the haemodynamic unfavorable reactions, numerous strategies have been proposed that focus on various places along the reflex arc. There are many suggestions for lowering reflex tachycardia and hypertension as a result.[4] Along with restricting the cardiovascular response, anesthesia for patients at risk must also be applied without the help of the patient, prevent impairment of cerebral blood flow, and keep the patient from becoming aroused. It shouldn't take

too long, and it shouldn't alter how long or what kind of anesthetic comes next.[5] The present study was conducted to evaluate effect of esmolol & dexmedetomidine in attenuating haemodynamic response to laryngoscopy and endotracheal intubation.

MATERIALS & METHODS

The present study consisted of 75 adult patients selected for elective surgery under general anaesthesia. A written informed consent from all patients was obtained.

Data such as name, age, gender etc. was recorded. In group I patients, 10 ml normal saline was administered 5 minutes before laryngoscopy and intubation. In group II patients, 0.5 mg/kg esmolol IV diluted to 10 ml with distilled water, 5 minutes before laryngoscopy and intubation was used. In group III, patients received 0.5μ/kg of dexmedetomidine IV diluted with distilled water to make 10 ml, 5 minutes before laryngoscopy and intubation. Parameters such as duration of laryngoscopy, HR (BPM), SBP (mmHg), DBP (mmHg), MAP (mmHg), RPP (mmHg/min) X 100, RSS, VAS and dose of propofol was recorded. Results thus obtained were statistically analysed. P value less than 0.05 was considered significant.

RESULTS

Table I Age-wise distribution of patients

Age group (years)	Group I	Group II	Group III
21-30	4	5	6
31-40	6	7	6
41-50	7	6	8
51-60	8	7	5

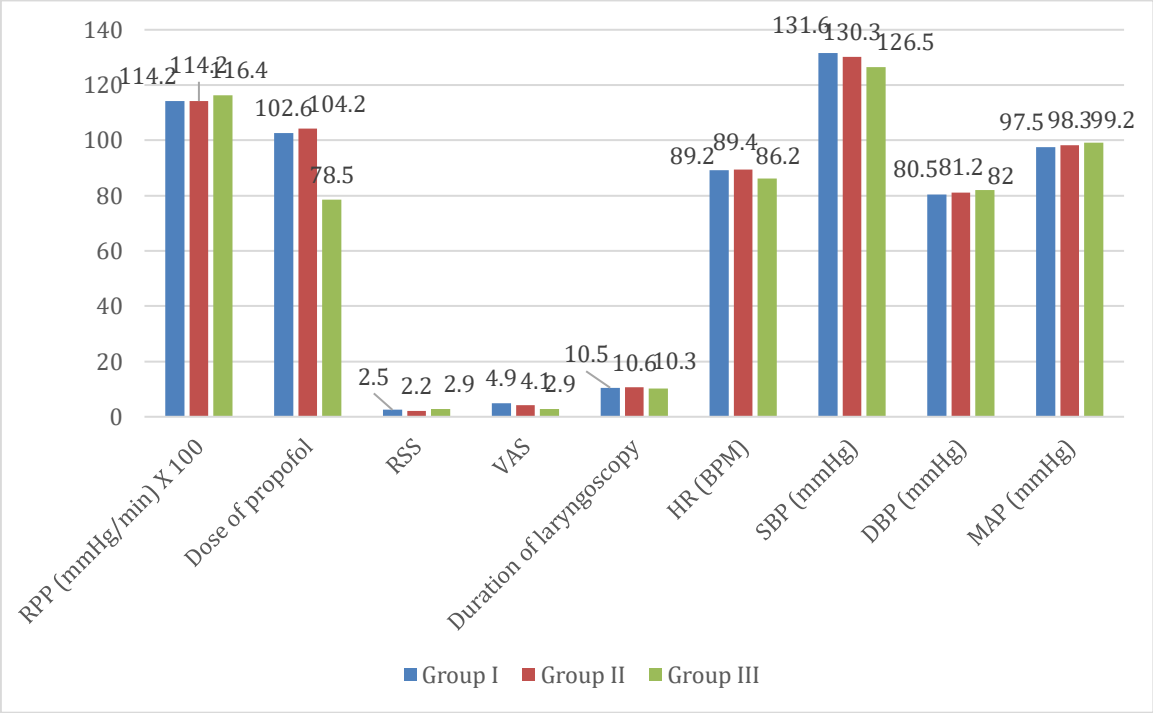
Table I shows that age group 21-30 years comprised of 4 patients in group I, 5 in group II and 6 in group III, age group 31-40 years had 6, 7 and 6, 41-50 years had 7, 6 and 8 and 51-60 years had 8, 7 and 5 patients respectively.

Table II Comparison of parameters

Parameters	Group I	Group II	Group III	P value
RPP (mmHg/min) X 100	114.2	114.2	116.4	0.91
Dose of propofol	102.6	104.2	78.5	0.84
RSS	2.5	2.2	2.9	0.94
VAS	4.9	4.1	2.9	0.74
Duration of laryngoscopy	10.5	10.6	10.3	0.91
HR (BPM)	89.2	89.4	86.2	0.54
SBP (mmHg)	131.6	130.3	126.5	0.67
DBP (mmHg)	80.5	81.2	82.0	0.71
MAP (mmHg)	97.5	98.3	99.2	0.87

Table II, graph I shows that RPP was 114.2 mmHg/min X 100, 114.2 mmHg/min X 100 and 116.4 mmHg/min X 100, dose of propofol was 102.6, 104.2 and 78.5, RSS was 2.5, 2.2 and 2.9 and VAS was 4.9, 4.1 and 2.9, duration of laryngoscopy was 10.5 minutes, 10.6 minutes and 10.3 minutes, HR (BPM) was 89.2, 89.4 and 86.2, SBP was 131.6 mm Hg, 130.3 mm Hg and 126.5 mm Hg, DBP was 80.5 mm Hg, 81.2 mm Hg and 82.0 mm Hg and MAP was 97.5 mm Hg, 98.3 mm Hg and 99.2 mm Hg in group I, II and III respectively. The difference was non-significant (P> 0.05).

Graph I Comparison of parameters



DISCUSSION

Inconvenient stimuli like laryngoscopy and tracheal intubation result in a fleeting but evident sympathetic response that elevates symptoms including heart rate (HR), blood pressure, and others. These changes, which reach their peak immediately after intubation and remain for 5–10 minutes, are probably tolerable by physically active and healthy people in patients with ASA 1 status. Cardiovascular disease patients' hemodynamic irregularities can lead to significant side effects include myocardial ischemia, sudden heart failure, and cerebrovascular accidents. There are a variety of treatment options available, including vasodilators such sodium-nitroprusside, nitroglycerin, topical lignocaine sprays, deeper planes of anesthesia using narcotics or intravenous (IV) medications, calcium channel blockers, or both. Despite the fact that there are numerous approaches, research on intubation and laryngoscopy pressor response attenuation is still underway.[6]

Laryngoscopy and endotracheal intubation are two crucial tools in anesthesiologists' toolbox for keeping the airway open. Since Rowbotham and Magill first described it in 1921, endotracheal intubation has been widely employed in the management of anesthesia and critical patient care. The intubation phase poses one of the greatest risks for surgical patients with coronary artery disease, as well as those who have both the condition and an intracranial aneurysm.[7] The response, even though it might only continue for a little period of time, is almost always significant, frequently persistent, and extremely unsettling. One of the most important aspects of contemporary anesthesia is preserving intraoperative hemodynamic stability. Unfavorable haemodynamic effects of stress brought on by anesthesia, surgery, and patient anxiety during the process include tachycardia, hypertension, and increased metabolic demands. All of these have the potential to cause negative perioperative outcomes.[8] Numerous drugs have been used to achieve perioperative anxiolysis, sleepiness, analgesia, and haemodynamic stability.[9] To avoid or lessen the stress reaction to anesthesia and surgery, preoperative medicine has traditionally included benzodiazepines, opioids, barbiturates, antihistamines, and beta-adrenoreceptor antagonists.[10,11] The present study was conducted to evaluate effect of esmolol & dexmedetomidine in attenuating haemodynamic response to laryngoscopy and endotracheal intubation.

We found that age group 21-30 years comprised of 4 patients in group I, 5 in group II and 6 in group III, age group 31-40 years had 6, 7 and 6, 41-50 years had 7, 6 and 8 and 51-60 years had 8, 7 and 5 patients respectively. Li et al[12] in their study HR compared with esmolol: dexmedetomidine attenuated the rise of heart rate at one, three, and five minutes after tracheal intubation. MAP compared with esmolol: dexmedetomidine attenuated the rise of mean arterial pressure at one, three, and five minutes after tracheal intubation. SBP compared with esmolol: dexmedetomidine attenuated the rise of systolic blood pressure at one, three, and five minutes after tracheal intubation. DBP compared with esmolol: dexmedetomidine attenuated the rise of diastolic blood pressure at one, three, and five minutes after tracheal intubation.

We observed that RPP was 114.2 mmHg/min X 100, 114.2 mmHg/min X 100 and 116.4 mmHg/min X

100, dose of propofol was 102.6, 104.2 and 78.5, RSS was 2.5, 2.2 and 2.9 and VAS was 4.9, 4.1 and 2.9, duration of laryngoscopy was 10.5 minutes, 10.6 minutes and 10.3 minutes, HR (BPM) was 89.2, 89.4 and 86.2, SBP was 131.6 mm Hg, 130.3 mm Hg and 126.5 mm Hg, DBP was 80.5 mm Hg, 81.2 mm Hg and 82.0 mm Hg and MAP was 97.5 mm Hg, 98.3 mm Hg and 99.2 mm Hg in group I, II and III respectively. But et al[13] evaluated the effects of pre-operative dexmedetomidine infusion on hemodynamics in patients with pulmonary hypertension after mitral valve replacement surgery. Randomly selected patients were divided into placebo and dexmedetomidine groups. Group D received a 1 g/kg bolus dose of dexmedetomidine 10 minutes before the start of anesthesia. The mean arterial pressure (MAP), mean pulmonary arterial pressure (MPAP), and pulmonary capillary wedge pressure (PCWP), as well as the post-sternotomy increase in the systemic vascular resistance index (SVRI) and pulmonary vascular resistance index (PVRI), were all significantly lower in group D when compared to the values in the placebo group.

CONCLUSION

During the intraoperative period, intravenous dexmedetomidine preserves haemodynamic stability while reducing the stress reaction to laryngoscopy and intubation. The haemodynamic reaction to laryngoscopy and intubation was more successfully suppressed by dexmedetomidine 0.5 mcg/kg, and intraoperative hemodynamic parameters were kept more constant.

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