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Original Research Article

Preanesthetic single dose intravenous dexmedetomidine versus intravenous for blunting of sympathetic response to laryngoscopy and endotracheal intubation: Clinical profile of patients

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Abstract

The sensory unit consists of free nerve endings that lie between the mucosal cells of the airway epithelium. Sensory units appear to be particularly abundant over the arytenoid cartilages and are also found on the laryngeal side of the epiglottis. Study was undertaken in patients planned for elective surgeries under General Anaesthesia. Patient were selected between 18 to 60yrs of Age with ASA 1 and ASA 2 grades. They were divided into 2 groups of 30 each and allocated randomly. All patients were explained about the procedure and its complication and informed consent obtained. There were no significant differences between the two groups with regard to demographic data such as age and weight. The average age in Group-C (clonidine) was 31.90 years and average age in Group D (dexmedetomidine) was 34.80 years.

Keywords: Dexmedetomidine, clonidine, laryngoscopy

Introduction

Lower pharynxx, epiglottis and larynx contain numerous sensory receptors which respond to chemical, thermal and mechanical stimuli. The mechanoreceptors are abundant especially in the lower pharyngeal wall, epiglottis and vocal cords. stimulation of these mechanoreceptors can produce reflex motor responses like cough, hiccup and also reflex sympathetic stimulation and cardiovascular pressor response [1].

The sensory unit consists of free nerve endings that lie between the mucosal cells of the airway epithelium. Sensory units appear to be particularly abundant over the arytenoid cartilages and are also found on the laryngeal side of the epiglottis. The superior lar ngeal nerve carries a large proportion of s1nall dia1neter 1nyelinated fibres (group III, A-delta, B sensory fibres) which carry afferent impulses. The recurrent laryngeal nerve also carries sensory fibres mainly from rapidly adapting receptors that are activated by light touch. These receptors are abundant on the inferior surface of the vocal cords [2]. Afferent fibres in the laryngeal nerves project centrally to the nucleus. The central reflex site is in medulla. The

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nucleus tracn1s solitarius at which the afferent impulses terminate is closely linked with vasomotor centre. Sympathetic activity originates within the reticular formation of the lower third of pons and the upper medulla from regions that are represented bilaterally. Together these areas are referred as the vasomotor centre. The neurons of vasomotor centre are under constant influence of afferent impulses that originate from mechanoreceptors located within the heart, lungs and arteries [3].
Each efferent sympathetic pathway is composed of a pre-ganglionic neuron. The cell bodies of pre-ganglionic neurons lie within the thoracic and upper lumbar spinal cord. These fibers pass from the cord via anterior routes of each spinal nerve and then via the white ramus to synapse with post ganglionic cell bodies located within the ganglia of the sympathetic chains. From these ganglia post ganglionic sympathetic nerves pass to their effector organs. Pre-ganglionic fibres of T8 to Tl 2 synapse in the adrenal medulla. Stimulation of these causes release of catechola1nines from the adrenal medulla into the circulation [4].

Methodology

Source of data

Data from the patients admitted and undergoing majorelective surgeries at Medical College and Hospital.

Study design: Prospective Double blind randomized comparative study.
Place of study: Patients admitted and undergoing major elective surgery at Dr. B.R. Ambedkar medical college and hospital, Bangalore.
Sample size: Hospital based study of 60 patients who fulfilled the inclusion criteria.

Inclusion criteria

- Patient aged between 18 to 60 years.
- ASA Physical status 1and 2.
- Both sexes.
- Undergoing major elective surgery under general anaesthesia.

Exclusion criteria

- Patients with cardiac disease.
- Severe pulmonary disease.
- Psychiatric illness.
- Severe renal derangement.
- Uncontrolled hype1tension.
- Diabetes mellitus.
- Pregnancy.
- Liver failure.

After obtaining approval from the institutional ethical committee patients fulfilling the inclusion/exclusion criteria were included in the study after obtaining informed consent.
A preanesthetic evaluation of history of surgical and medical illness, drug allergies previous anaesthetic exposure and Baseline investigations of blood, ECG, radiograph of chest and airway examination was done. Patient was kept nil by mouth for at least 8hrs prior to surgery. All patients were premedicated with injection Pantoprazole 40mg (IV) one hour prior to surgery. Preoperative vital parameters like baseline pulse, blood presslire were noted.
Study was undertaken in patients planned for elective surgeries under General Anaesthesia.

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Patient were selected between 18 to 60yrs of Age with ASA 1 and ASA 2 grades. They were divided into 2 groups of 30 each and allocated randomly. All patients were explained about the procedure and its complication and informed consent obtained.

Results

Table 1: Demographic Profile (Mean ± SD)

Patient Characteristics	Group C Mean ± S.D	Grnup D Mean ± S.D	"p" Value
1. Age (YRS)	31.90±8.08	34.80 ±9.48	0.207
2. Weight	52.16±10.08	54.27 ±9.21	0.403

There were no significant differences between the two groups with regard to demographic data such as age and weight.
The average age in Group-C (clonidine) was 31.90 years and average age in Group D (dexmedetomidine) was 34.80 years.

Table 2: Age distribution in two groups of patients studied

Age Group	Group C	Group D	Total
21- 30	16(53.3%)	14(46.7%)	30(50.0%)
31-40	8(26.7%)	5(16.7%)	13(21.7%)
41-50	5(16.7%)	10(33.3%)	15(25.0%)
>50	1(3.3%)	1(3.3%)	2(3.3%)
Total	30(100%)	30(100%)	60(100%)
Mean ± SD	31.90±8.08	34.80±9.48	33.35±8.85

No significant differences were found with respective age.

Table 3: Gender distribution in two groups of patients studied

Gender	Group C	Group D	Total
Female	15(50%)	14(46.7%)	29(48.3%)
Male	15(50%)	16(53.3%)	31(51.7%)
Total	30(100%)	30(100%)	60(100%)

Samples are gender matched with p=0.796, Chi-Square test.

Both the groups were comparable with respect to demographic profile. No significant differences were found with respect to gender.

Table 4: Weight (kg) distribution in two groups of patients studied

Weight (kg)	Group C	Group D	Total
20-40	4(13.3%)	2(6.7%)	6(10.0%)
41-60	22(73.3%)	21(70.0%)	43(71.7%)
>60	4(13.3%)	7(23.3%)	11(18.3%)
Total	30(100%)	30(100.0%)	60(100.0%)
Mean ± SD	52.16± 10.08	54.27±9.2 1	53.22±9.63

Samples are weight matched with P=0.403, Student t Test.

There were no significant differences between the two groups with. Regard to weight.

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Table 5: ASA grade distribution in two groups of patients studied

ASA grade	Group C	Group D	Total
1	18(60%)	15(50%)	33(55%)
2	12(40%)	15(50%)	27(45%)
Total	30(100%)	30(100%)	60(100%)

P=0.436, Not Significant, Chi-Square Test.

Discussion

The cardiovascular changes and catecholamine release should be divided into two phases, differentiating the act of laryngoscopy and its effects, from the act of tracheal insertion of an endotracheal tube (or of a catheter or bronchoscope). Laryngoscopy alone, without intubation provides a supraglottic pressure stimulus with significant increases in both systolic and diastolic pressures from a central level of stable anaesthetic state, as well as increases above the pre-induction control levels. Increases in heart rate are slight and are not significant from laryngoscopy alone [5].

The second phase, or the act of intubation and placement of an endotracheal tube in the trachea or a catheter, stimulates infraglottic receptors and evokes an additional cardiovascular response with a further increase in catecholamines. The pressor response is much greater, increasing by 36% from pre-induction control levels. heart rate also now significantly increases by about 20% with act of tracheal intubation, whereas as noted earlier, there is little rate response to laryngoscopy alone [6].

Neuroendocrine response to endotracheal intubation which leads to hypertension and tachycardia causes variety of complications in patients with cardiac disease. The major determinants of myocardial oxygen demand are heart rate and blood pressure and when endotracheal intubation causes marked increase in a1terial pressure and heai1 rate, the increase in myocardial oxygen demand must be met by an increase in supply of oxygenated blood through coronary circulation. When one or more occlusive coronary lesions results in relatively fixed coronary blood flow, ability to increase myocardial oxygen supply during periods of increased demand is minimal and abrupt increase in myocardial demand results in tissue ischemia that can result in myocardial dysfunction or tissue infarction.

Further, ischemia induced by arterial hypertension may be compounded by increase in left ventricular end-diastolic pressure resulting in further compromise of perfusion to subendocardial tissue. These circumstances are responsible for episodes of ST segment depression in ECG and increased pulmonary artery diastolic pressure in patients with atherosclerosis [7]. Occasionally these episodes predispose to the occurrence of perioperative myocardial infarction.

Patients with vascular anomalies that cause weakening of lining of major arteries are a risk during endotracheal intubation. Integrity of cerebral and aortic aneurysm is largely a function of transmural pressure; a sudden increase in blood pressure can lead to rupture of vessel and abrupt deterioration of patient's status. This results in significant blood loss for anesthesiologists to replace and additional technical problems for surgeon trying to inspect the lesion and insert a vascular prosthesis [8].

Conclusion

Both the groups were comparable with respect to demographic profile. No significant differences were found with respect to gender.

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