



A COMPARATIVE EVALUATION OF THE EFFECTS OF DEXMEDETOMIDINE AND CLONIDINE TO ATTENUATE HEMODYNAMIC RESPONSE OF LARYNGOSCOPY AND INTUBATION IN PATIENTS UNDERGOING LAPAROSCOPIC SURGERY

Anaesthesiology

Dr Shakuntala Goswami

BJ Medical College, Ahmedabad

Dr Athmika*

BJ Medical College, Ahmedabad*Corresponding Author

Dr Sapan Parikh

BJ Medical College, Ahmedabad

Dr Yatharth Desai

BJ Medical College, Ahmedabad

ABSTRACT

This study was designed to compare the effectiveness of intravenous Dexmedetomidine & Clonidine to attenuate the hemodynamic responses associated with laryngoscopy and endotracheal intubation in patients undergoing laparoscopic surgery under general anaesthesia. Cardiovascular response to laryngoscopy and endotracheal intubation has always become a challenge for anesthetists. Cardiovascular response may occur in form of hypertension, tachycardia and different types of arrhythmias. These effects may prove disastrous in patients of hypertension, myocardial insufficiency, eclampsia and patients with raised intracranial tension.

KEYWORDS

INTRODUCTION

Direct Laryngoscopy and endotracheal intubation are invariably associated with certain cardiovascular changes such as hypertension, tachycardia and wide variety of cardiac arrhythmias. These hemodynamic changes occur due to epipharyngeal and laryngopharyngeal stimulation which causes reflex increase in sympathoadrenal activity and sympathetic discharge[1]. Increase in blood pressure and heart rate are usually transient, variable and unpredictable. These effects are usually of no consequences in healthy individuals but it may be hazardous in patients with hypertension, myocardial insufficiency, eclampsia, and patients with raised intracranial tension. A variety of drugs and methods have been tried to attenuate this stress response [2] such as premedicating patient with antihypertensive drugs like vasodilators, beta blocker, calcium channel blocker, α -2 agonist, nitroglycerine, ACE inhibitor, opioids, lignocaine, deepen plane of anaesthesia, decreasing laryngoscopy time.

In this study we are comparing Dexmedetomidine and Clonidine for its effects to attenuate haemodynamic response of laryngoscopy and intubation in patients undergoing laparoscopic surgery. Dexmedetomidine is a highly selective α -2 adrenergic agonist that has sedative, anxiolytic, sympatholytic and analgesic effect[3]. It has shown to decrease induction doses of intravenous anaesthetic agent and to decrease the intra operative opioid and volatile anaesthetic requirements for maintenance of anaesthesia^[4].

Clonidine is widely accepted for producing controlled hypotension. It is a selective α 2-adrenergic agonist with some α 1-agonist property[5]. It acts by a central adrenergic mechanism reducing sympathetic nervous system output. It diminishes requirements for inhaled anesthetics, enhances the effects of sedative, anxiolytic and analgesic drugs. It also decreases stress response to laryngoscopy and intubation.^[6]

AIMS AND OBJECTIVES

- To study the various cardiovascular responses to laryngoscopy and intubation in normotensive patients undergoing elective surgery under general anaesthesia.
- To study and compare the effect of intravenous dexmedetomidine & clonidine given before laryngoscopy and endotracheal intubation, on hemodynamic responses (heart rate, systolic, diastolic and mean arterial blood pressure) till 30 minutes from intubation in normotensive patient.
- To compare any side effects, complications, intra-operatively and immediate postoperatively.

MATERIALS AND METHODS

The randomized control study was conducted after the ethical committee approval.

Patients were randomly divided into 2 groups of 30 each: Group C: will receive Inj. Clonidine 1.0 μ g/kg diluted in 100 ml NS injected IV slowly over 10 min given 10 mins before Induction, Group D: will receive Inj. Dexmedetomidine 1.0 μ g/kg IV diluted in 100 ml NS injected slowly over 10 min given 10 mins before induction.

Inclusion Criteria:

Age 18 to 65 years, ASA grade I,II, Patients undergoing elective surgery of more than half an hour.

Exclusion criteria:

ASA grade III, IV and V, known case of bronchial asthma, hypertension, IHD, patients with atrial/ventricular arrhythmias, second/third degree A-V conduction block, patients with congestive heart failure and terminal valvular insufficiency, patients with severe hemodynamic instability like severe anaemia, hypotension, patients on beta adrenergic antagonist therapy/calcium channel blockers, patients with anticipated difficult airway.

All the monitors were attached and patients were prepared on the OT table.

All patients were pre-medicated with Inj. Glycopyrrolate 0.004mg/kg IV, Inj. Ondansetron 0.15 mg/kg IV, Inj. Fentanyl 1 μ g/kg IV.

Group C: Received Inj. Clonidine 1.0 μ g/kg diluted in 100 ml NS injected IV slowly over 10 min given 10 mins before induction.

Group D: Received Inj. Dexmedetomidine 1.0 μ g/kg diluted in 100 ml NS injected IV slowly over 10 min given 10 mins before induction.

Induction of anaesthesia was carried out using Inj. Thiopentone sodium 8mg/kg IV and Inj.

Suxamethonium 2mg/kg IV. Intubation was carried out using an appropriate size ET tube.

Anaesthesia was maintained using 50% oxygen, 50% nitrous oxide, 1% sevoflurane and Inj. Vecuronium Bromide 0.1mg/kg IV Loading Dose and Inj. Vecuronium Bromide 0.025mg/kg incremental dose as and when required. On completion of surgery, patient was reversed using Inj. Glycopyrrolate 0.008mg/kg IV and Inj. Neostigmine 0.05mg/kg IV.

All observation were recorded and results were analysed statistically. Data was expressed as mean $\pm$ SD.

For comparing data between 2 groups, Student-t test (analysis of variance) was used and p value < 0.05 will be interpreted as clinically significant.

RESULTS

60 patients aged between 18 years to 60 years of either sex belonging to ASA class I and II posted for various elective laparoscopic surgeries under general anaesthesia at our institute were randomly divided into 2 groups with 30 patients in each group.

Group C: will receive Inj. Clonidine 1.0 µg /kg diluted in 100 ml NS injected IV slowly over 10 min given 10 mins before induction.

Group D: will receive Inj. Dexmedetomidine 1.0 µg/kg diluted in 100 ml NS injected IV slowly over 10 min given 10 mins before induction.

Demographic data were compared in both groups and there was no statistical significance.

Table 1-Comparison of changes in Mean Heart rate±S.D. between two groups

TIME INTERVAL	GROUP C (n=30)		GROUP D (n=30)		P VALUE
	MEAN	SD	MEAN	SD	
BASELINE	87.6	7.673	88.2	9.590	0.790
PREMEDICATION	83.867	8.123	85.8	8.876	0.382
INDUCTION	85.567	6.730	88.6	9.145	0.149
INTUBATION	99.233	9.134	96.567	10.170	0.019
1MIN	98.4	8.923	93.533	9.085	0.040
3 MIN	90.7	8.949	86.5	7.825	0.058
5 MIN	81.733	8.030	79.433	7.248	0.249
15 MIN	72.833	6.592	77.5	7.152	0.011
30 MIN	72.533	5.399	77.8	6.293	0.001

There was significant fall in heart rate observed at 30 minutes after intubation.

Table 2- Comparison of changes in mean systolic blood pressure±S.D> between both groups

TIME INTERVAL	GROUP C (n=30)		GROUP D (n=30)		P VALUE
	MEAN	SD	MEAN	SD	
BASELINE	123.2	13.752	124.167	12.903	0.780
PREMEDICATION	123	11.785	124.6	11.831	0.602
INDUCTION	124.4	11.944	127.367	11.288	0.327
INTUBATION	134.933	11.703	134.867	11.371	0.982
1MIN	133.733	11.516	133.133	10.411	0.833
3 MIN	128.7	10.703	126.4	10.437	0.403
5 MIN	123.367	9.831	122.267	9.355	0.659
15 MIN	118.467	9.050	121.233	7.523	0.203
30 MIN	118.567	7.947	121.633	7.854	0.138

There was no significant difference of systolic blood pressure observed between both groups.

Table 3- Comparison of changes in mean diastolic blood pressure ±S.D> between both groups

TIME INTERVAL	GROUP C (n=30)		GROUP D (n=30)		P VALUE
	MEAN	SD	MEAN	SD	
BASELINE	80.067	10.379	80.5	9.175	0.864
PREMEDICATION	80.467	9.529	81.533	8.693	0.652
INDUCTION	81.533	8.697	82.867	7.514	0.528
INTUBATION	90.533	8.827	88.6	7.351	0.360
1MIN	89.667	8.260	87.833	7.377	0.368
3 MIN	84.733	8.111	82.833	7.502	0.350
5 MIN	80.167	8.120	79.833	7.086	0.866
15 MIN	76.7	7.307	77.4	6.393	0.694
30 MIN	76.267	5.965	77.9	5.821	0.288

There was no significant difference of diastolic blood pressure observed between both groups.

None of the patient in both the groups developed complications like bradycardia, hypotension intra operatively. None of the patient in both the groups developed complications like nausea, vomiting, bradycardia, hypotension, shivering and sedation post operatively.

DISCUSSION**AGE, SEX AND WEIGHT**

Both the groups were comparable for demographic data like age, body weight and sex there was no statistically significant difference in both the groups.

HEMODYNAMIC PARAMETERS**(A)HEART RATE:**

As shown in table 1, baseline values of mean heart rate were comparable between both the groups with no statistically significant difference ($P>0.05$). Changes in the heart rate after giving study drug and after induction were also not statistically significant between both the groups ($P>0.05$). Heart rate increased in both the groups after intubation. In group C increase in heart rate (99.133 ± 9.134) was more than group D (96.567 ± 10.170) and P value is 0.0185. After 30 minutes group C showed heart rate of 72.533 ± 5.399 as compared to group D showing 77.8 ± 6.293 with P value of 0.001 which is statistically significant

Ganesh Nikam, Madhukrishna N et al [7] observed in their study that there was rise in Heart rate with clonidine group after intubation. M. T. Taittonen, O. A. Kirvela et al [8] used Clonidine 4microgram/kg and Dexmedetomidine 2.5 microgram/kg. They observed fall in heart rate intraoperatively in both the groups compared to placebo group, but their dose was higher than our study.

(B)SYSTOLIC BLOOD PRESSURE:

As shown in table 2, Systolic Blood Pressure in group C was 134.933 ± 11.703 and group D was 134.867 ± 11.371 ($P=0.982$) after intubation. But there was no statistically significant difference in systolic blood pressure in both the Groups ($P>0.05$). There was no statistically significant difference in systolic blood pressure between both the groups at 1, 3, 5, 15 and 30 minutes after intubation (P value >0.05). Ganesh Nikam, Madhukrishna N. et al [7] observed that dexmedetomidine group had lower systolic blood pressure as compared to clonidine group.

M. T. Taittonen, O. A. Kirvela, et al [8] observed comparable fall in blood pressure.

(C)DIASTOLIC BLOOD PRESSURE:

As shown in table 3, Diastolic Blood Pressure in group C was 90.533 ± 8.827 and group D was 88.6 ± 7.351 ($P=0.360$). But there was no statistically significant difference in diastolic blood pressure in both the Groups ($P>0.05$).

There was no statistically significant difference in diastolic blood pressure between both the groups at 1,3,5, 15 and 30 minutes after intubation (P value >0.05).

Ganesh Nikam, Madhukrishna N. Et al [7] observed that dexmedetomidine group had lower diastolic blood pressure as compared to clonidine group.

M. T. Taittonen, O. A. Kirvela, et al [8] observed comparable fall in blood pressure and heart rate.

COMPLICATION:

None of the patients in both the groups shown intra and post operative complications like hypotension,

bradycardia, nausea, vomiting, shivering and sedation.

Ganesh Nikam, Madhukrishna N. et al [7] observed hypotension in one patient in dexmedetomidine group which was managed by infusing intravenous fluids without inotropic support.

SUMMARY

This study was designed to study and compare the effectiveness of intravenous Clonidine and Dexmedetomidine in attenuating sympathomimetic response to direct laryngoscopy and endotracheal intubation in patients undergoing laparoscopic surgical procedures under General anaesthesia.

- 1) The demographic profile of the patients in terms of age, body weight and sex were comparable in both groups.
- 2) There was increase in the heart rate, systolic blood pressure and diastolic blood pressure during laryngoscopy and intubation in both groups.

- 3) Dexmedetomidine shown significant reduction in heart rate at time of laryngoscopy and endotracheal intubation as compared to clonidine. Clonidine significantly reduces Heart rate as compared to dexmedetomidine after 30 minutes of intubation, that may be due to longer duration of action of clonidine.
- 4) There was no significant difference in attenuation of systolic and diastolic blood pressure in both groups. They both attenuate blood pressure changes following intubation comparably.
- 5) No serious side effects or complications were found in any of the study groups.

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