

## Attenuation of Haemodynamic Responses to Laryngoscopy & Intubation - A Comparative Study Between Intravenous Dexmedetomidine And Intravenous Clonidine

Dr. Suhasinirajashekar<sup>1</sup>, Dr. Sherry Mathews<sup>2</sup>, Dr. N Satyanarayana<sup>3</sup>

<sup>1</sup>Resident, <sup>2</sup>Associate Professor, <sup>3</sup>Prof & HOD Shadan Institute Of Medical Sciences Hyderabad

---

**Abstract:** The present work is a prospective clinical study comparing the effects of IV Dexmedetomidine and IV Clonidine on attenuation of haemodynamic parameters during laryngoscopy and intubation in patients undergoing elective open cholecystectomy operation under general anaesthesia.

**Materials & Methods:** The present study was conducted in the Department of Anaesthesiology of Shadan Institute of Medical Sciences, Hyderabad during the period from Aug, 2014 to July, 2015. Patients undergoing elective open cholecystectomy at Operation Theatres of Department of General Surgery of Shadan Institute of Medical Sciences, Hyderabad. They were divided into two groups with 60 cases in each group by matching patient's age, sex and ASA grading. GROUP D- (Dexmedetomidine group). In this group patients received 1mcg/kg dexmedetomidine IV, 15 mins before laryngoscopy and intubation. GROUP C- (Clonidine group). All the patients in this group received 1mcg/kg of Clonidine IV, 15 minutes before laryngoscopy and intubation.

**Results:** The incidence of bradycardia was more in dexmedetomidine group, however it was not statistically significant. With the present study Inj. dexmedetomidine at a dose of 1mcg/kg IV was able to prevent adverse haemodynamic changes better than Inj. clonidine 1 mcg/kg IV prior to laryngoscopy and intubation during elective surgeries under general anaesthesia.

**Conclusion:** From the findings of this study it can be concluded that IV bolus dose of Dexmedetomidine 1mcg/kg administered 15 minutes prior to laryngoscopy and intubation can attenuate the sympathetic response to laryngoscopy and intubation without any major side effects of the drug, in otherwise healthy patients undergoing elective surgeries under general anaesthesia

**Keywords:** IV Dexmedetomidine, Intravenous Clonidine, Attenuation, Intubation Laryngoscopy, Haemodynamic Response.

---

### I. Introduction

After the introduction of endotracheal anaesthesia in the last quarter of 19<sup>th</sup> century, endotracheal intubation has become one of the frequently performed procedures in the practice of anaesthesia. Laryngoscopy and intubation involves manipulation of airway and the sensory part of the airway is of great concern during the manipulation. The circulatory responses to laryngeal and tracheal stimulation following laryngoscopy and intubation were documented by Reid and Brace, 1940 and King et al 1951 and interpreted as reflex sympathoadrenal stimulation.<sup>1</sup>

The process of laryngoscopy and intubation are noxious stimuli and therefore constitute a period of extreme haemodynamic stress and is associated with intense sympathetic activity marked by tachycardia and hypertension.<sup>1</sup>

The cardiovascular response is reflex phenomenon, which is mediated by the Vagus (X) and Glossopharyngeal nerve (IX). Vagus and Glossopharyngeal carry the afferent stimulus from epiglottis and infraglottic region and activate the vasomotor centre to cause a peripheral sympathetic adrenal response to release adrenaline and noradrenaline which causes the effect.<sup>2</sup>

The increase in heart rate and blood pressure are transitory, variable and unpredictable. Normal individuals can tolerate this response but in susceptible individuals, this transient sympathetic response can evoke life threatening conditions.<sup>3</sup> Hence to overcome these undesirable responses, multiple pharmacological and non-pharmacological strategies have been studied to minimize the hemodynamic adverse response by acting at different levels of the reflex arc.

None of these techniques are completely effective so there has been a focus on the use of  $\alpha_2$ -adrenergic agonists. These drugs by virtue of their sympatholytic (i.e antihypertensive and negative chronotropic) action, attenuate the hemodynamic response following laryngoscopy and endotracheal intubation. These drugs also have sedative, anxiolytic and analgesic effects, which are an added benefit. Dexmedetomidine is currently used in the ICU for sedation and analgesia in mechanically ventilated patients and produces rapid recovery after discontinuation.

Hence considering the adverse effects associated with laryngoscopy and intubation, dexmedetomidine 1mcg/kg i/v and clonidine 1mcg/kg i/v have been chosen to find out the effectiveness in suppressing the hemodynamic responses to laryngoscopy and endotracheal intubation.

## II. Aim & objectives

The aim of the study is to evaluate and compare the efficacy of single premedication dose of dexmedetomidine 1 mcg/kg i/v and clonidine 1 mcg/kg i/v. In attenuation of haemodynamic responses to laryngoscopy and endotracheal intubation, and Side effects, if any.

**Materials & Methods:** It was a Prospective clinical study. This study was conducted after the approval from the Institutional Ethics Committee and with written informed consent from each patient after explaining the study procedure to them in their own language.

**Inclusion criteria:** Patients aged between 20 – 50 yrs of both the sexes. Patients scheduled for elective open cholecystectomy surgeries under general anaesthesia. Patients with ASA grade I or II. Grade 1- Normal Healthy Patients Grade 2- Patients With Mild Systemic Disease. Mallampati airway assessment of grade I.

**Exclusion Criteria:** Unwilling patients, Emergency surgeries anticipated difficult intubation, Patients with ASA grade III or higher, Patients with neurological and other endocrine abnormalities. Patients with renal impairment and hepatic disease. Patients with cardiovascular diseases, diabetes mellitus, asthma COPD etc. Patients on beta blockers or calcium channel blockers. Patients on psychotropic drugs or history of drug allergies. Patients with language or communication difficulties. Previous records of failed intubation.

**Sample Size:** A total of 120 adult patients of either sex between the age group of 20 to 50 years of ASA-1 and ASA-2 undergoing elective open cholecystectomy were divided randomly by sequentially numbered opaque sealed envelope method, into two groups of 60 patients each.

**GROUP – D** (Dexmedetomidine group) in this group patients received 1 mcg/kg dexmedetomidine IV in 100ml 0.9% normal saline given in 10 mins, 15 mins before laryngoscopy and intubation.

**GROUP-C** (Clonidine group) all the patients in this group received 1 mcg/kg of Clonidine IV in 100ml 0.9% normal saline given in 10 mins, 15 minutes before laryngoscopy and intubation.

All pre-anaesthetic evaluation was performed in each patient including detailed history taking, thorough physical examination and routine preoperative investigations. The nature and procedure of the study was explained to the patients. All patients had routine preoperative fasting for 6 hours before surgery.

### Investigation:

- Hb%, TC, DC, and ESR
- RBS
- Blood urea, serum creatinine & Liver Function Test
- ECG
- Chest x-ray

## III. Statistical Analysis

The data were recorded on predesigned and pretested proforma, and was tabulated and master chart was prepared. Demographic data, Heart Rate (HR), systolic BP, diastolic BP and Mean arterial pressure (MAP) were tabulated as Mean  $\pm$  SD. Statistical significance were tested by Student 't' test and Fisher's exact test wherever applicable using the computer program Graph Pad Instat. Microsoft Word and Excel have been used to generate graphs and tables. p value of less than 0.05 was considered significant.

## IV. Results & observations

The present work is a prospective clinical study comparing the effects of IV Dexmedetomidine and IV Clonidine on attenuation of haemodynamic parameters during laryngoscopy and intubation in patients undergoing elective open cholecystectomy operation under general anaesthesia.

**The tables are as follows:**

**Table–1** Showing Count Distribution

Group	Total numbers
Group D	60
Group C	60

**Table-2 Showing Age Distribution:**

AGE (in years)	GROUP	DEXMEDEMIDINE (Group-D)		CLONIDINE (Group-C)	
		n	%	n	%
20—30		35	58.33	34	56.66
31—40		23	38.33	24	40.00
41—50		2	3.34	2	3.34
TOTAL		60	100.00	60	100.00

**Table -3 Showing Age Comparison:**

	AGE(Mean±SD)	P VALUE
GROUP D	30.68±7.53	0.9072
GROUP C	30.57±7.65	

The mean age of patients in group D was 30.68 ± 7.53 years and in group C it was 30.57± 7.65 years with a p value more than 0.05 and hence both the groups were comparable in relation to age distribution.

**Table-4 Showing Sex Distribution:**

SEX	DEXMEDEMIDINE (Group-D)		CLONIDINE (Group-C)	
	n	%	n	%
Male	31	51.67	30	50.00
Female	29	48.33	30	50.00
TOTAL	60	100.00	60	100.00

In Group D, 51.67 % were males and 48.33% were females and in Group C, 50.00 % were males and 50.00 % were females. Hence, both the groups were comparable in relation to sex distribution.

**Table-5 Showing Weight Distribution:**

WEIGHT (Kgs)	GROUP	DEXMEDEMIDINE (Group-D)		CLONIDINE (Group-C)	
		n	%	n	%
40-50		18	30.00	16	26.66
51-60		24	40.00	28	46.68
61-70		18	30.00	16	26.66
TOTAL		60	100.00	60	100.00

**TABLE-6 SHOWING WEIGHT COMPARISON:**

GROUP	Weight(kgs) Mean±SD	P VALUE
GROUP D	59.72±7.72	0.3602
GROUP C	61.23±8.52	

The mean weight of patients in Group D was 59.72 ± 7.72 kgs and in Group C was 61.23 ± 8.52kgs with p value of more than 0.05 which is not significant and hence both the groups were comparable.

**Table-7 Showing Asa Physical Status Of Patients**

Group	ASA I	Percentage	ASA II	Percentage	P value
Group D	34	56.66	26	43.34	0.4286
Group C	32	53.33	28	46.67	
Total	66	55.00	54	45.00	

From the above table, 55.00 % belonged to ASA I and 45.00 % belonged to ASA II physical status. In group D 56.66 % were of ASA I in comparison to 53.33 % in Group C. Patients having ASA II comprised of 43.34 % in Group D and 46.67 % in Group C. The p value is 0.4286 and hence, both the groups were comparable with respect to ASA physical status.

**Tables Showing Haemodynamic Parameters:**

**Table-8 Group D: Dexmedetomidine:**

Time interval	HR(Mean±SD)	SBP(Mean±SD)	DBP(Mean±SD)	MAP(Mean±SD)
T1	80.61±11.10	123.27±9.61	75.27±9.46	92.41±8.36
T2	72.02±11.60	114.23±9.71	67.44±9.75	84.32±9.41
T3	81.40±12.75	127.04±8.73	73.94±11.38	91.98±8.13
T4	79.8±11.54	117.25±9.93	68.07±9.37	86±44±8.50
T5	76.72±9.66	114.33±8.74	63.34±7.80	82.33±6.81
T6	72.24±11.26	114.12±8.58	62.10±8.23	81.38±6.13

T7	77.34±11.65	113.36±9.92	72.25±6.77	86.31±7.94
----	-------------	-------------	------------	------------

**Table-9. Group C: Clonidine**

Time interval	HR(Mean±SD)	SBP(Mean±SD)	DBP(Mean±SD)	MAP(Mean±SD)
T1	78.94±6.37	117.50±8.37	78.2±6.33	91.63±6.37
T2	73.22±4.93	110.31±9.23	77.95±6.98	88.07±6.17
T3	85.07±7.53	127.4±7.97	88.97±6.94	101.78±7.91
T4	84.03±7.09	123.1±10.46	87.13±6.64	97.12±6.87
T5	82.23±8.07	119.83±11.03	84.3±7.51	93.18±8.68
T6	79.54±6.98	117.06±11.52	82.1±7.81	94.75±7.58
T7	77.67±6.48	119.47±13.26	84.2±9.01	94.64±6.56

**Table-10 Comparison Between Intraoperative Heart Rate (Per Minute) Changes:**

Time interval	Group D (Mean±SD)	Group C (Mean±SD)	P value	Significance
T1	82.05±11.10	76.94±6.38	0.0623	NS
T2	72.04±11.60	75.23±6.94	0.0256	S
T3	81.44±12.70	85.08±6.40	0.0018	S
T4	76.8±10.47	84.04±7.02	0.0029	S
T5	74.63±9.45	82.24±6.08	0.0019	S
T6	74.7±11.24	79.57±6.84	0.0283	S
T7	74.2±11.63	79.64±5.49	0.0353	S

The table shows intraoperative heart rate changes of patients at various intervals of the procedure. In Group D, the change were found at lower level as compared to Group C except for baseline reading where it was statistically insignificant.

The maximum rise in HR immediately after intubation in Group C was 9.85/min whereas in Group D it was only 09.40/min which was significant. The intra-group variation of heart rate were found to be more stable in Group D than that of Group C which showed wide range of variation during the whole intra-operative period.

**Table- 11. Comparison Between Systolic Blood Pressure Changes In Group D And Group C:**

SBP(mmHg)	Group D (Mean±SD)	Group C (Mean±SD)	P value	Significance
T1	126.27±8.81	118.5±9.45	0.1156	NS
T2	114.23±8.81	110.31±8.16	0.0171	S
T3	129.05±8.63	127.4±8.87	0.0314	S
T4	119.26±8.98	123.1±11.46	0.0458	S
T5	116.35±7.64	119.83±11.03	0.0390	S
T6	113.11±9.48	120.06±11.52	0.0236	S
T7	113.35±8.12	119.48±11.24	0.0286	S

The above table shows intraoperative systolic blood pressure changes of patients of Group D which were found to be significantly lower level as compared to Group C at various intraoperative periods of the procedure except for the pre-operative level.

The maximum rise in SBP immediately after intubation was 17.09 mm Hg and 14.82 mm Hg in Group C and D respectively. This signifies that Dexmedetomidine effectively obtunded the rise in SBP as compared to clonidine. The SBP were found to be more stable in Group D than Group C during intra-operative period.

**table-12 comparison between diastolic blood pressure changes in group d and group c**

DBP(mmHg)	Group D (Mean±SD)	Group C (Mean±SD)	P value	Significance
T1	77.28±8.59	77.2±6.33	0.0752	NS
T2	69.43±10.85	76.96±7.96	0.0001	S
T3	74.93±10.37	87.96±6.93	0.0001	S
T4	69.06±9.67	86.13±6.74	0.0001	S
T5	64.33±7.89	83.36±7.61	0.0001	S
T6	62.00±8.32	82.10±8.51	0.0001	S
T7	73.24±7.57	85.20±8.01	0.0001	S

The table indicates that intraoperative diastolic blood pressure changes of Group D patients were at significantly lower level as compared to Group C at various intraoperative periods of the procedure except for baseline level.

The DBP difference was maximum immediately after and prior to intubation which was found to be 11 mm Hg and 5.5 mm Hg for Group C and D respectively. This shows that hemodynamic effects maintained better in Group D during laryngoscopy and intubation.

**Table-13:** Comparison Between Mean Arterial Pressure Changes In Group D And Group C

DBP(mmHg)	Group D (Mean±SD)	Group C (Mean±SD)	P value	Significance
T1	92.61±7.46	91.53±6.45	0.4676	NS
T2	82.36±8.31	88.09±7.19	0.0001	S
T3	91.97±8.04	101.79±7.91	0.0001	S
T4	86.48±9.60	99.12±7.98	0.0001	S
T5	82.34±6.74	96.19±8.68	0.0001	S
T6	81.38±7.10	92.56±7.51	0.0001	S
T7	86.61±6.91	92.64±7.65	0.0001	S

Finally the above table shows that mean arterial pressure changes of Group D patients were at significantly at lower level as compared to Group C at various intraoperative periods of the procedure.

The MAP difference was maximum immediately after and laryngoscopy and intubation which was 9.61 mm Hg in case of Group D, and 13.7 mm Hg in case of Group C. This shows that hemodynamic effects was maintained better in Group D during laryngoscopy and intubation.

**Adverse Effects**

**Table-14** Showing Adverse Effect

Group	Bradycardia		p value
	Count	Percent	
Dexmedetomidine	6	10%	0.1140
Clonidine	1	2%	
TOTAL	60	60	

Bradycardia was noticed in 6 patients in dexmedetomidine group, and in 1 patient in clonidine group, which was treated with inj. Atropine. But was not statistically significant.

**V. Discussion**

Laryngoscopy and tracheal intubation are considered as the most critical events during administration of general anaesthesia. The process of Laryngoscopy and tracheal intubation provoke transient but marked sympathoadrenal response manifesting as hypertension and tachycardia<sup>1</sup>.

Normal individuals can tolerate this transient but marked sympathoadrenal response manifesting as hypertension and tachycardia well, but in patients with cardiovascular compromise like hypertension, Ischemic heart disease, Cerebrovascular disease and in patients with intracranial aneurysms even these transient changes in haemodynamics can result in potentially harmful effects like left ventricular failure, pulmonary edema, myocardial ischemia, ventricular dysrhythmias and cerebral haemorrhage<sup>3</sup>. This is by far the most important indication for attenuation of haemodynamic response to laryngoscopy and tracheal intubation.<sup>4</sup>

Several attempts have been made to block the peripheral sensory receptors and afferent input by topical application of Local anesthetics (LA)<sup>5,6</sup>. It has also been tried to block the central mechanisms of integration of sensory input by using Intravenous (IV) Fentanyl, Morphine etc. The efferent pathway and effector sites have been blocked by using IV Lignocaine,<sup>7</sup>  $\beta$ -blockers,<sup>8</sup> Calcium-channel blocker.<sup>9,10,11</sup> Vasodilators (Sodium Nitroprusside, Nitroglycerine).<sup>12,13</sup> Magnesium sulphate etc. Other methods attempted at reducing the sympatho-adrenal response include minimizing mechanical stimuli of laryngoscopy by blind nasal intubation and reducing time of laryngoscopy to < 15 seconds.

Dexmedetomidine is a highly selective  $\alpha_2$  receptor agonist with an  $\alpha_2:\alpha_1$  specificity of 1620:1.<sup>14</sup> The major sedative, hypnotic and antinociceptive effects of Dexmedetomidine are attributed to its agonism of the presynaptic  $\alpha_2$  adrenergic receptors in the locus coeruleus, which inhibits the release of norepinephrine terminating the propagation of pain signals and inhibits sympathetic activity thus decreasing the BP & HR. Clonidine hydrochloride is an imidazoline derivative. It is a centrally acting adrenergic agonist that lowers blood pressure by decreasing basal sympathetic nervous system activity. It act by selective stimulation post synaptic adrenergic receptors in the central nervous system, more specifically the nucleus solitarii of the medulla oblongata and reduction in catecholamine levels. This causes inhibition of basal efferent vasoconstrictor effects on the peripheral and renal vasculature.<sup>15</sup>

Hence, this study was undertaken to evaluate the efficacy of IV dexmedetomidine and IV clonidine in maintaining haemodynamic stability by reduction of laryngoscopy and intubation stress response in 120 patients undergoing open cholecystectomy surgeries under general anaesthesia at Shadan Institute of Medical Sciences Hyderabad. The patients were divided into two groups viz. Group D receiving Inj. dexmedetomidine 1 mcg/kg and Group C receiving Inj. Clonidine 1 mcg/kg.

In this study, 51.67 % were males and 48.33 % were females in Group D and 50 % were males and 50 % were females in Group C. Hence, both the groups had compatible sex distribution. Most of the patients (group

D 58.33 % and group C 56.66 %) in both the groups were aged between 20-30 years. The mean age of patients in Group D was  $30.68 \pm 7.53$  years and in Group C was  $30.57 \pm 7.65$  years with a p value more than 0.05 and hence both the groups were comparable. The mean weight of patients in Group D was  $59.72 \pm 7.72$  kg and in Group C was  $61.23 \pm 8.52$  kg with p value of more than 0.05 which is not significant and hence both the groups were comparable. In the whole study, 55 % belonged to ASA I and 45 % were having ASA II physical status. In Group D 56.66 % were of ASA I as compared to 53.33 % in Group C. Patients having ASA II comprised 43.34 % in Group D and 46.66 % in Group C. The p value was 0.5312 and hence, both the groups were comparable with respect to ASA physical status.

Hence all the demographic parameters were comparable in both the groups.

In another study, Anish Sharma NG<sup>16</sup> in 2014 conducted a study on premedication with I.V dexmedetomidine vs I.V clonidine in attenuating the pressor responses during laryngoscopy and endotracheal intubation. In this study, 60 patients in the age group 20-40 yrs, of either sex belonging to ASA grade I & II were randomly divided into 2 groups, each consists of 30 each. Group I-dexmedetomidine, group II clonidine. SBP, DBP, MAP, HR, SPO<sub>2</sub> were recorded at 1 min (T<sub>3</sub>), 3 min (T<sub>4</sub>), 5 min (T<sub>5</sub>) & 10 min (T<sub>6</sub>) after laryngoscopy & intubation. They found that on an average HR decreased by 10-12 beats (T<sub>1</sub>) in both groups, maximum decrease in dexmedetomidine group was 30 beats and in clonidine group 25 beats. At T<sub>3</sub> (at 1 min after intubation) maximum increase in HR in dexmedetomidine group was 18 beat/min and in clonidine group was 25 beat/min. at T<sub>4</sub> (3 min after intubation) maximum increase in HR was 16 beat/min in dexmedetomidine group and 22 beats/min in clonidine group. HR responses to intubation was higher in clonidine group when compared to dexmedetomidine group which was statistically significant ( $p < 0.001$ ). on an average SBP, DBP, and MAP decreased by 18-22 mmHg, 14-18 mmHg, 14-16 mmHg respectively (T<sub>1</sub>) in both groups. There was slight increase in BP at intubation (T<sub>3</sub>) in both the groups (on an average SBP, DBP and MAP increased by 8-10 mmHg, 4-5 mmHg respectively) but it remained below the pre induction values. At T<sub>4</sub>, T<sub>5</sub>, T<sub>6</sub> BP displayed a downward trend and that was comparable in both the groups. HR, SBP, DBP, MAP returned to preinduction values by 10 mins of intubation.

Author concluded that both clonidine and dexmedetomidine are effective in attenuating the stress response during laryngoscopy and intubation but dexmedetomidine was more effective in attenuating the tachycardia response. This was again in favour of our study where dexmedetomidine in a dose of 1 microgram showed better responses in obtunding pressor responses to laryngoscopy and intubation than clonidine.

Also recently Sameer et al in 2014<sup>17</sup> did a study to compare the effects of Dexmedetomidine (1 µg/kg) and Clonidine (1 µg/kg) on hemodynamic responses to endotracheal intubation, effect on anaesthetic requirements and effect on sedation. In this prospective double blind study, 60 patients scheduled for elective surgeries under general anaesthesia were randomly divided into two groups Group D (Inj. Dexmedetomidine dose 1 µg/kg iv) and Group C (Inj. Clonidine dose 1 µg/kg iv). Patients belonging to ASA I & ASA II of both sexes aged 20-60 years, were included in this comparative randomized study. Pulse, blood pressure, ECG were monitored continuously and recorded before giving the study drug after giving the study drug, at intubation then at 1, 3, 5, 10 minutes after intubation. Data were analysed and  $p < 0.05$  was considered significant.

Dexmedetomidine group had 4.70% rise in heart rate at time of intubation and Clonidine group had 9.59% rise which was statistically significant ( $p < 0.05$ ), except during intubation, difference in heart rate between two groups was not significant ( $p > 0.05$ ). Group C had significant rise in SBP and DBP during intubation compared to Group D. Maximum rise in SBP and DBP in Group C was 14.53% and 12.84% respectively, whereas in Group D it was 5.55% and 8.90% respectively. Dexmedetomidine group had better sedation than Clonidine group ( $p < 0.05$ ).

Authors concluded Dexmedetomidine significantly attenuated the sympathetic response of laryngoscopy and intubation as compared to Clonidine. The results of this study matched with our study where we noticed that dexmedetomidine and clonidine in the same dose in this study was quite effective in attenuating the pressor responses during laryngoscopy and intubation.

Similar findings were found by S. Shanbagavalli, Shivashankar M et al<sup>18</sup> in 2014 who conducted a study to compare I.V dexmedetomidine & I.V clonidine in attenuating the pressor responses during laryngoscopy & endotracheal intubation. Total of 60 patients in the age group 20-40 years, belonging to ASA grade I & II scheduled for elective procedures under GA were randomly to receive either dexmedetomidine or clonidine. Group I patients received clonidine 3 µg/kg in 100 ml NS, 10 min before induction and group II patients received dexmedetomidine 1 µg/kg in 100 ml NS, 10 min before induction. HR, SBP, DBP, MAP were monitored at T<sub>0</sub>, T<sub>1</sub>, T<sub>2</sub>, T<sub>3</sub>, T<sub>4</sub>, T<sub>5</sub>, T<sub>6</sub> respectively. Anaesthesia was maintained O<sub>2</sub>, N<sub>2</sub>O, isoflurane and vecuronium at titrated doses. T<sub>0</sub>- basal reading when the patient is shifted to OT, T<sub>1</sub>-5 min after infusion of dexmedetomidine/clonidine, T<sub>2</sub>-at induction (2 min after sleep dose of thiopentone sodium), T<sub>3</sub>- 1 min after intubation, T<sub>4</sub>- 3 min after intubation, T<sub>5</sub>-5 min after intubation, T<sub>6</sub>-10 min after intubation. They found that on an average HR decreased by 10-12 beats (T<sub>1</sub>) in both groups. Maximum decrease in HR in dexmedetomidine group was 30 beats and in clonidine 25 beats. At T<sub>3</sub> (1 min after intubation) maximum increase in heart rate in

dexmedetomidine group was 18 beats/min and in clonidine group was 25 beats/min. At T4(3 min after intubation) maximum increase in HR was 16 beats /min in dexmedetomidine group and 22 beats/min in clonidine group. HR responses to intubation was higher in clonidine group when compared to dexmedetomidine group which was statistically significant ( $p < 0.001$ ). SBP, DBP and MAP decreased by 18-22 mmHg, 14-18 mmHg, 14-16 mmHg respectively (T1) in both the groups. There was slight increase in BP at intubation (T3) in both groups( on an average SBP, DBP and MAP increased by 8-10 mmHg, 6-8 mmHg, 4-5 mmHg respectively) but it remained below the pre induction values. At T4, T5, T6 Bp displayed a downward trend and that was comparable in both groups. HR, SBP, DBP, MAP returned to preinduction value by 10 min of intubation.

Authors came to the conclusion that both clonidine and dexmedetomidine are effective in attenuating the stress response during laryngoscopy and intubation but dexmedetomidine was more effective in attenuating the tachycardia response. This was again in favour of our study where dexmedetomidine obtunded better the pressor response of laryngoscopy and intubation than clonidine.

### **VI. Limitations Of This Study**

Present study was done in a small group of 60 patients each in both the groups. All patients belonging to ASA I and II and most of the patients were from younger age-group. Patients with comorbid conditions like hypertension and diabetes, etc. were not included in the study. Hence the advantages of using clonidine or dexmedetomidine in patients having comorbid diseases could not be evaluated. The various drugs used in the present study are known to influence the haemodynamic changes which were not evaluated. The patients, who were put in this study were intubated successfully in the first attempt. Perhaps the haemodynamic parameters would have shown a different picture in patients with difficult intubation.

### **VI. Summary**

Various pharmacological agents have been used to attenuate this response. Both dexmedetomidine and clonidine have been found to be effective in attenuating this response and in maintaining hemodynamic stability during laryngoscopy and intubation.

The procedure was explained to the patient. After arrival of the patient to the operating room, ECG and heart rate were monitored continuously and non-invasive recordings of systolic, diastolic and mean arterial pressure at 5 min intervals was done. A vein was cannulated for intravenous infusion and 150-200 ml of RL was administered before administration of the study drugs. The patient was premedicated with glycopyrrolate (0.2mg), ondansetron (4mg), ranitidine (50mg) and tramadol (1.5mg/kg). The patient was then preoxygenated with 100% oxygen for 3mins before induction with a tight fitting face mask. Anaesthesia was induced with Inj. Propofol (2mg/kg) IV and then Inj. Succinylcholine was administered at a dose of 1 – 1.5 mg/kg IV.

Laryngoscopy was done using rigid laryngoscope with standard Macintosh blade and intubation was done with appropriate sized disposable, high volume low pressure cuffed endotracheal tube. The patients were then ventilated with 66% nitrous oxide and 33% oxygen with a tidal volume of 8-10ml/kg and a rate of 12 – 15 breaths per minute. For maintenance of relaxation, Inj. atracurium was administered according to body weight (0.5mg/kg). Increase in blood pressure up to 20% of basal BP was managed by increasing isoflurane concentration and more than 20% of basal BP was managed by titrated nitroglycerine infusion. Systolic blood pressure, diastolic blood pressure, mean arterial pressure, heart rate were recorded at regular predetermined intervals. Any intra-operative or post-operative complications were noted and were managed accordingly.

With the present study we may summarize that Inj. dexmedetomidine at a dose of 1mcg/kg IV was able to prevent adverse haemodynamic changes better than Inj. clonidine 1 mcg/kg IV prior to laryngoscopy and intubation during elective surgeries under general anaesthesia.

### **VII. Conclusion**

On the basis of our present clinical comparative study, we can come to a conclusion that Inj. Dexmedetomidine 1mcg/kg IV administered 15 minutes prior to laryngoscopy and intubation was able to prevent adverse haemodynamic changes resulting from laryngoscopy and intubation better than Inj. Clonidine 1 mcg/kg IV administered 15 mins prior to laryngoscopy and intubation during elective surgeries under general anaesthesia. Also, dexmedetomidine maintained a stable haemodynamic profile throughout the whole intra-operative period. Heart rate, systolic blood pressure as well as diastolic blood pressure were better maintained within normal limits by dexmedetomidine.

Dexmedetomidine was found to be more effective than clonidine in attenuating the sympathetic response to laryngoscopy and intubation.

From the findings of this study we can come to a conclusion that IV bolus dose of Dexmedetomidine 1mcg/kg administered 15 minutes prior to laryngoscopy and intubation can attenuate the sympathetic response to laryngoscopy and intubation without any major side effects of the drug, in otherwise healthy patients undergoing elective surgeries under general anaesthesia.

### References

- [1]. Reid LC, Brace DE. Irritation of the respiratory tract and its reflex effect upon heart. *SurgGynaec&Obst.* 1940; 70:157–62.
- [2]. Derbyshire DR, Chmielewski A, Fell D, Vaters M. Plasma catecholamine responses to tracheal intubation. *BJA.* 1983; 55: 855-9.
- [3]. Fox EJ, Sklar GS, HillCH. Complications related to pressor response to endotracheal intubation. *Anaesthesiology.* 1977; 47: 524-25.
- [4]. King BD, Harris LC. Reflex circulatory responses to direct laryngoscopy and tracheal intubation performed during general anaesthesia. *Anesthesiology.* 1951; 12:556-566
- [5]. Donlinger, JK Ellison N, OminskyAJ. Effects of intrathecal lidocain on circulatory responses to tracheal intubation. *Anaesthesiology.* 1974;41:409-12
- [6]. Stoelting R. Circulatory Changes during Direct Laryngoscopy and Tracheal Intubation. *Anesthesiology.* 1977;47(4):381-383.
- [7]. Denlincer J, Ellison N, Ominsky A. Effects of Intratracheal Lidocaine on Circulatory Responses to Tracheal Intubation. *Anesthesiology.* 1974;41(4):409-412.
- [8]. Prys-roberts c, foëx p, biro g, roberts j. Studies of anaesthesia in relation to hypertension v: adrenergic beta-receptor blockade. *Br j anaesth.* 1973;45(7):671-681.
- [9]. Puri GD, Batra YK. Effect of Nifedepine on cardiovascular response to laryngoscopy and intubation. *Br J Anaesth.* 1988; 60:579-81.
- [10]. Nishikawa T, Naiki A. Attenuation of the pressor response to laryngoscopy and tracheal intubation with IV Verapamil. *Act AnaesthesiologicaScandinavica.* 1989; 33:232-5.
- [11]. Fuji Y, Tanaka H, Saitoh Y, Toyooka H. Effects of Calcium channel blockers on circulatory response to tracheal intubation in hypertensive patients: Nicardipine versus Diltiazem. *Canadian Journal of Anaesthesia.* 1995; 42:785-8.
- [12]. Stoelting RK. Attenuation of blood pressure response to laryngoscopy and tracheal intubation with Sodium Nitroprusside. *Anesthesia Analgesia.* 1979; 58:116-9.
- [13]. Fossoulaki A, Kaniasis P. Intranasal administration of Nitroglycerine attenuates the pressor response to laryngoscopy and intubation of the trachea. *Br J Anaesth.* 1983; 55:49-52.
- [14]. Scheinin H, Aantaa R, Anttila M, Hakola P, Helminen A, Karhuvaara S. Reversal of the sedative and sympatholytic effects of dexmedetomidine with specific alpha-2 receptor antagonist atipamazole; pharmacodynamic and kinetic study in healthy volunteers. *Anaesthesiology.* 1998; 89:574-84.
- [15]. Kobinger W, Walland A. Facilitation of vagal reflex bradycardia by an action of clonidine on central  $\alpha$ -receptors. *European Journal of Pharmacology.* 1972;19(2):210-217.
- [16]. Anish Sarma N G, P.P. S. Premedication with I.V dexmedetomidine vs IV clonidine in attenuating the pressor responses during laryngoscopy & endotracheal intubation. *International journal of biomedical research.* 2014; (5);7
- [17]. Arora S, Parikh H, karia S, Garg N, Upadhyaya R. A comparative study to haemodynamic response: dexmedetomidine 1 $\mu$  gm/kg vs clonidine 1 $\mu$  gm/kg. *2014 International Journal of Biomedical Research.* 2014; ( 5):12
- [18]. Shanbagavalli S, M S, K.S Lk, N.G AS. Comparison of I V dexmedetomidine& I Vclonidine in attenuating the pressor response during laryngoscopy & endotracheal intubation. (2014), [cited September 21, 2015]; 1(1): 24-27.