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Original Research Article

Comparative Evaluation of Attenuation of Sympathomimetic Response to Laryngoscopy and Intubation with I.V. Labetalol or I.V. Dexmedetomidine in Head Injury Patient's Posted For Surgery

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Abstract:

Aim: A prospective comparative clinical double blinded study was carried out to compare the efficacy of I.V. Labetalol or I.V. Dexmedetomidine for attenuation of sympathomimetic response to laryngoscopy and intubation in head patients posted for surgery.

Background: Laryngoscopy and intubation is associated with sympathetic stimulation, increase in pulse rate and blood pressure. There are different method have been tried to attenuate the pressure response. The study was conducted to compare the efficacy of Dexmedetomidine and Labetalol for attenuation of hemodynamic response to Laryngoscopy and intubation in head injury patients.

Method: 64 head injury patients of age 18-60 year, the American society of Anesthesiology I to III, randomized into two group, 32 each, to receive Labetalol (Group L): 0.25 mg/ kg and Dexmedetomidine (Group D): 1mcg/kg, both diluted to a total volume to 100 ml with 0.9% normal saline, infused over a period of 10 minute, 10 minute prior to intubation, change in heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure(DBP), were compared among group at preinduction, post induction, post intubation 1,3,5,10 minute.

Result: statistically significant decrease in HR, SBP, DBP were observed in group D after Laryngoscopy and intubation when compared to group L, Also the relative incidence of bradycardia and hypotension was higher in group L.

Conclusion: Infusion of Dexmedetomidine was better as compared to Labetalol in attenuation of hemodynamic response to laryngoscopy and intubation in head injury patients.

Keywords: Laryngoscope, Intubation, Labetalol, Dexmedetomidine, Head injury.

Introduction

Administration of general anesthesia through laryngoscopy and endotracheal intubation is the most important and essential skill for an anesthesiologist. However both laryngoscopy and endotracheal intubation is a noxious stimuli and induces sympathomimetic responses.

A sudden rise in blood pressure during laryngoscopy and intubation in neurosurgical patients may cause increase intracranial pressure, increase intracranial haemorrhage adverse hemodynamic effect (Left ventricular failure, myocardial infarction), arrhythmia. [1-2] Thus prevention and control of this hemodynamic response are of utmost importance to preserve the cerebral homeostasis [3].

Various attempt have been advocated at different level of reflex arc to block the efferent pathway and effector site with drug, e.g. Volatile inhalation agent, lignocaine [4], opioid [5], sodium nitroprusside [6], nitroglycerine, calcium channel blocker, adrenergic blocker, esmolol

Dexmedetomidine [11,12], is imidazole compound. It is dextroisomer of medetoimidine, that is dose dependent alpha 2 adrenoreceptor agonist. It is highly selective alpha 2 agonist, that has been shown to have sedative, analgesic, sympatholytic, and anaesthetic sparing effect without significant effect on respiration.

Labetalol is an non-selective adrenergic receptor blocking agent, that has an effect on both selective alpha 1 and nonselective beta receptor, with the ratio of alpha to beta of 1\7 which is used for hypertension treatment and control. It has rapid onset of action .Its maximum action begin within 5 mint and has the duration of 5 hour [13]. We planned this study to compare the efficacy of

Labetalol and Dexmedetomidine for attenuation of the sympathomimetic response during laryngoscopy and intubation in head injury patients posted for surgery in general anaesthesia.

Material and Methods

The proposed study titled as Comparative evaluation of attenuation of sympathomimetic response to laryngoscopy and intubation with I.V. Labetalol or I.V. Dexmedetomidine in head injury patients posted for surgery was carried out in Swaroop Rani Nehru Hospital associated with Moti Lal Nehru Medical College, Prayagraj (formerly Allahabad) over a period of one year, after approval from ethical committee and obtaining written and informed consent from the patients.

Study Design: This Prospective randomized comparative double blinded study was conducted on 64 adult patients.

Study Duration: it was conducted over a period of one year from July 2019 to June 2020.

Inclusion Criteria

1. Sex : either
2. Patients with age 18 to 60 years
3. ASA grade: I to III
4. Haemodynamically stable patients

Statistical Analysis: All statistical analysis was performed using IBM SPSS Statistics Version 25 (SPSS, Chicago, IL, USA). Crosstab was used to compare gender with the study groups. One-way anova was used to compare means and standard deviation of different parameters used in study group. A two-sided P value <0.05 was considered statistically significant.

Randomization: Patient eligible for the study (64 patients) were randomly allocated in to the, two study group of 32 patients, Randomization was performed through a computer-generated, random-number list. The random-number list was generated by means of the QuickCalcs (GraphPad Software Inc, La Jolla, CA).

Group allocation: patients were randomly allocated and divided into two group (32 patient in each group) using computer generated random number table.

Group L Labetalol	32 patients	Each patient received 0.25 mg /kg of body weight diluted to a total volume of 100 ml with 0.9% saline given over a period of 10-minute, 10 minute prior to intubation.
Group D Dexmedetomidine	32 patients	Each patient received 1µgm/kg, of body weight diluted to a total volume of 100 ml with 0.9% saline, given over a period of 10 minute, 10 minute prior to intubation.

Blinding:

Double blinding was achieved by three different anaesthesiologists one for preparation of the study drug, second for administration of the drug and third for data collection. Hence the observer and patient both are unaware of the study.

Methodology:

Pre-anesthetic evaluation of all patients, done before the surgery, consisted of:

- Detailed history
- Physical examination
- Systemic examination
- Routine investigations (CBC, LFT, RFT, Serum electrolyte, RBS, ESR, BT, CT, PT, INR)
- Special investigations wherever required. (CT head, X ray chest, MRI brain)

Patient eligible for the study (64 patients) were randomly allocated into the, two study group of 32 patients. The group's assignment numbers were sealed in an envelope and kept by the study supervisor. After the written consent was signed, the opaque envelope was unsealed to determine which drug would be used. The allocation ratio was 1:1.

Patients were shifted to the operation theatre 30 min before induction. IV line secured with 18 G IV cannula, pulse oximeter, noninvasive BP (NIBP), electrocardiogram (ECG) monitor, and end-tidal carbon dioxide (EtCO2) had been attached. HR, BP both SBP, DBP, recorded had been considered as baseline (BL) value. Injection, ondansetron 0.08 mg/kg as anti-emetic, had been given intravenously and infusion of normal saline started at the rate of 2 ml/kg/h.

The test drugs were administered as per group allotted, drugs were given as intravenous infusion over a period of 10 minute and the infusion was completed 10 minute prior to induction of anesthesia and were prepared by an independent anesthesiologist not involved in the study, in identical syringes and infused with infusion pump. Study drug was diluted in equal amount of normal saline in both group and transfused over similarly.

The patients were pre-oxygenated with 100% oxygen by face mask for 3-minute Induction will be done with Propofol 1.5 mg /kg of body weight. Neuromuscular blockade had been achieved by rocuronium bromide 0.6 mg /kg of body weight, Intermittent-positive pressure ventilation continued with 100% O2 and after adequate relaxation 90 sec. later. Intubation time used to be limited to ≤30 s, in all the cases in one intubation attempt. Anaesthesia was maintained with oxygen [40%], nitrous oxide

[60%], Isoflurane was used when required or 15 mint after intubation to prevent any additional changes in vital of patient, No surgical or any other stimulus were applied during 15 minutes of study period. Intermittent bolus of intermediate acting muscle relaxant of non – depolarizing type inj. Rocuronium 0.15mg/kg of body weight. The lungs were mechanically ventilated, Ventilation was adjusted to maintain an end-tidal carbon dioxide (EtCO2) value between 30 and 35 mmHg. Patients were observed for any episode of bradycardia (HR<50beat/minute), hypotension (SBP<20% baseline), dysrhythmia (rhythm other than sinus rhythm) and any other adverse effect during surgery. At the end of surgery neuromuscular blockade was reversed with inj.

Neostigmine [0.05mg/kg of body weight] and inj Glycopyrrolate [0.01mg/kg of body weight], and after return of reflexes, extubation was performed and patients were transferred to the PACU.

Parameters for analysis

Heart rate (HR), Systolic blood pressure (SBP), Diastolic blood pressure (DBP), were recorded baseline (pre-induction), post-induction after intubation 1, 3, 5, 10 min after orotracheal intubation.

Result

Table 1: Demographic and clinical characteristics of Head injury patients, treated with Dexmedetomidine and Labetalol

Variable		Dexmedetomidine Treatment Group (N=32)	Labetalol Treatment Group (N=32)	P Value	Result
Gender	Male%	18 (56.3%)	17 (53.1%)	0.500	Not significant
	Female %	14 (43.8%)	15 (46.9%)		
Age(Year)	Mean ± SD	38.75±9.45	38.56±8.11	0.932	Not significant
Weight(Kg)	Mean ± SD	61.25±5.97	59.69±6.78	0.322	Not significant
Height(Cm)	Mean ± SD	160.84±5.66	161.66±9.16	0.671	Not significant

There was no statistically significant difference(P>0.05) between the two groups as regards demographic data such as age, weight, height, sex of patients. There was good attenuation of heart rate, in I.V. Dexmedetomidine group in comparison to I.V. Labetalol group, post induction, after intubation at 1 minute, 3 minute,5 minute, 10 minute ,which was statistically significant (P<0.05).

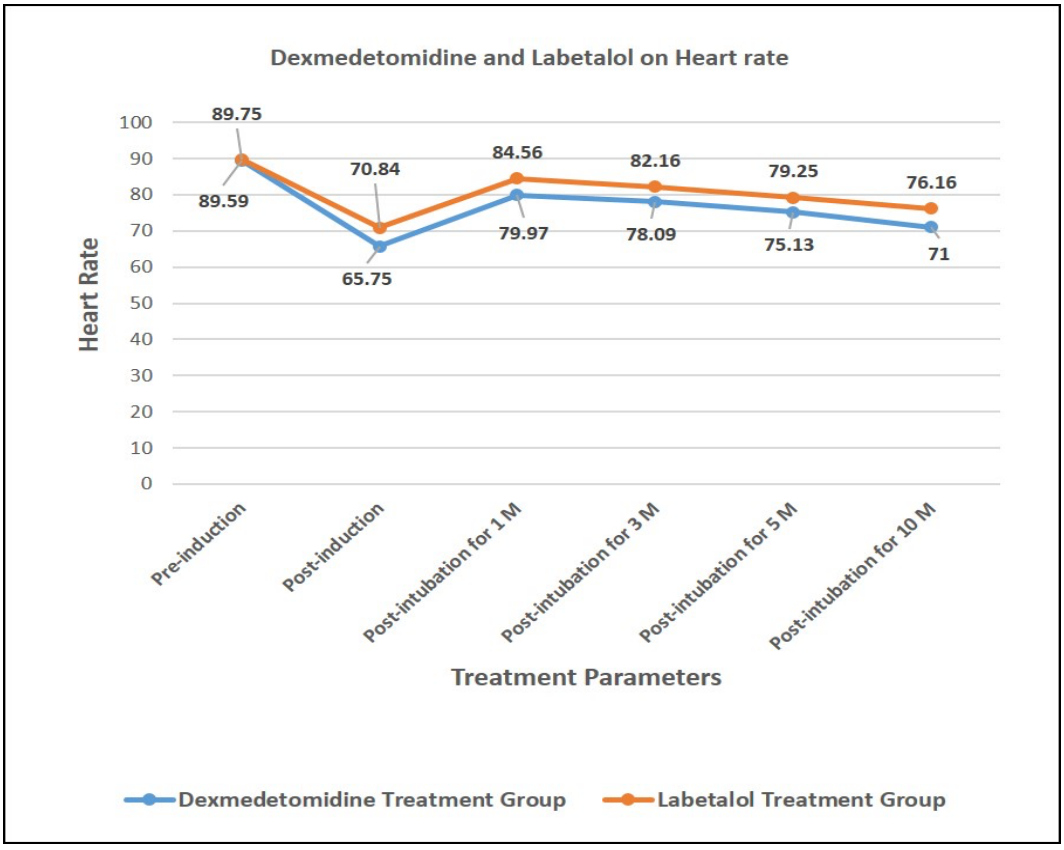

Figure 1: Mean heart rate (beat per minute) changes between the group

There was good attenuation of SBP, in I.V. Dexmedetomidine group in comparison to I.V. Labetalol group, post induction, after intubation at 1 minute, 3 minute,5 minute, 10 minute, which was statistically significant (P<0.05).

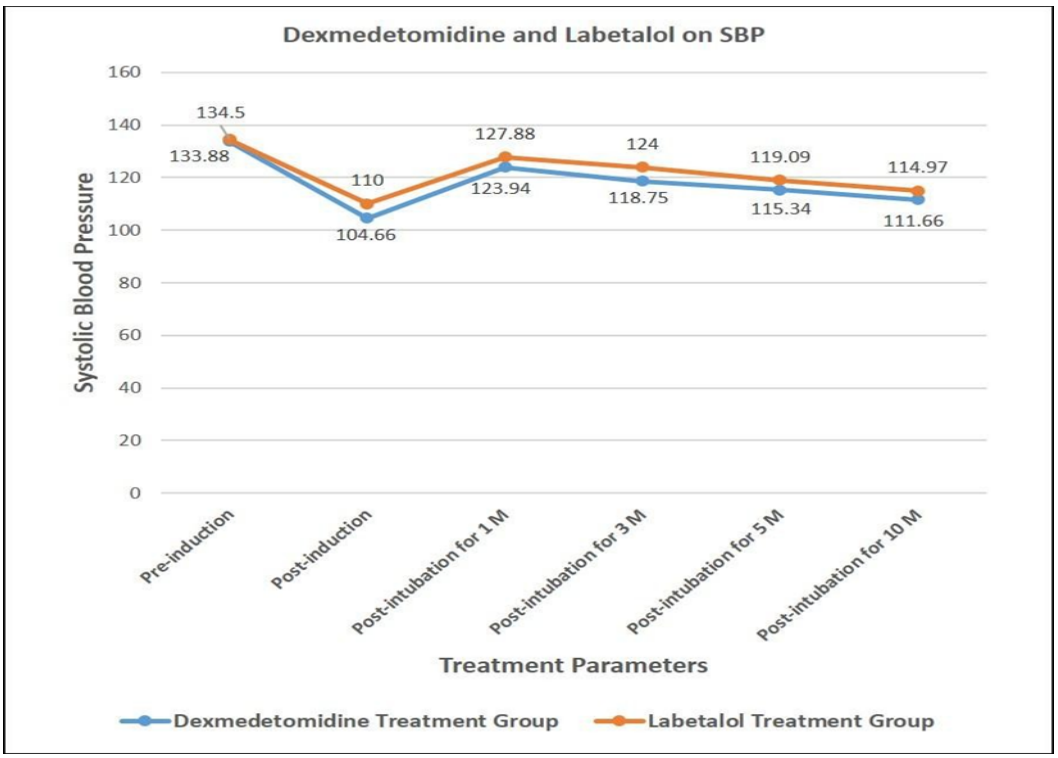

Figure 2: Mean Systolic blood pressure (mmhg) changes between the group

There was good attenuation of DBP, in I.V. Dexmedetomidine group in comparison to I.V. Labetalol group, post induction, after intubation at 1 minute, 3 minute,5 minute, 10 minute, which was statistically significant (P<0.05).

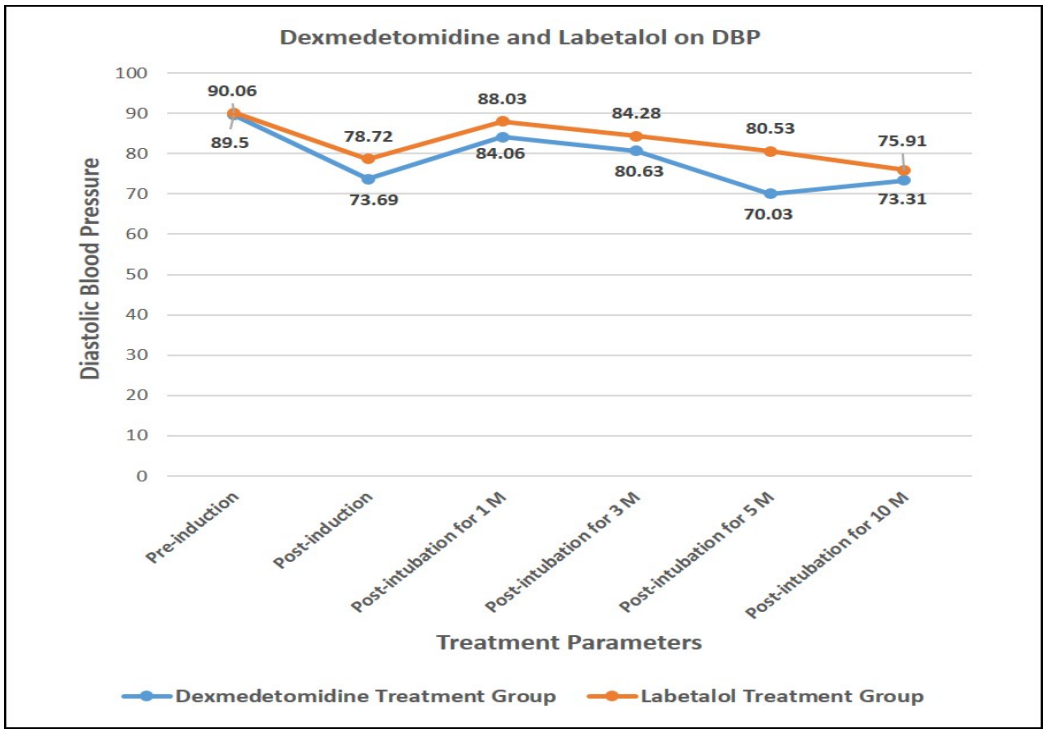

Figure 3: Mean Diastolic blood pressure (mmhg) changes between the group

Table 2:

Complications	Group L(32)	Group D(32)
Bradycardia	6(19%)	0(100%)
Hypotension	4(13%)	0(100%)
Tacycardia	0(100%)	0(100%)
Hypertension	0(100%)	0(100%)

Bradycardia and hypotension was seen after 15 minute in Labetalol group but there was no complication seen in Dexmedetomidine group.

Discussion

A haemodynamic response of increased heart rate and blood pressure due to stimulation of epipharynx and laryngopharynx, following laryngoscopy and intubation, has been well recognized for 60 years. Subsequently, Shribman et al [7]. Showed in 24 patients undergoing elective surgery that laryngoscopy alone increased blood pressure and that laryngoscopy and intubation together increased both heart rate and blood pressure.

In this study we have compared 2 drug, dexmedetomeidine vs labetalol in controlling blood pressure and pulse during laryngoscopy and tracheal intubation in head injury patients, posted for surgery.

In our study we chose to administer injection dexmedetomeidine I.V. infusion over a period of 10 mints in the dose of 1 µg/kg diluted to a total volume of 100 ml with 0.9% saline, no maintenance infusion was used. Pipanmekaporn et al [8], used similar dose of dexmedetomidine to attenuate stress response to intubation and found to be effective As far as labetalol is concerned, we used an intravenous dose of Labetalol 0.25 mg kg−1. Singh et al [9] used a similar dose of labetalol 0.25mg/kg as our study and found it to be more effective than esmolol at a dose of 0.5 mg kg−1.

In our study Patient in 2 group were similar in demographic variable including age , sex, weight, and also height since this factor can affect the result, their confounding effect was neutralized in our study.

In result of the present study were in agreement with those of the study done by, In a study Nagat S. El-Shmaa et al [9], conducted study to, compare the efficacy of 0.25 mg/kg labetalol i.v bolus, with dexmedetomidine at a dose of 1 µg/kg diluted in 100 ml of normal saline i.v., found that intravenous dexmedetomidine significantly attenuated hemodynamic response to laryngoscopy and intubation but could not obtund it completely. Singla D et al [10] conducted a study, to compare, dexmedetomidine 1.0 µg kg−1 i.v. and labetalol 0.3 mg kg−1 i.v. in 100 ml of normal saline before induction of anaesthesia found that demedetomeidine is more suitable than labetalol for maintaining normal haemodynemic parameter in patients.

Kewalramani A et al [11] conducted a prospective, randomized study in 2016 for comparing Labetalol versus dexmedetomeidine to assess the haemodynemic responses to laryngoscopy and intubation during induction of general anaesthesia, dexmedetomeidine found better in controlling haemodynemic responses to laryngoscopy than Labetalol.

Solanki NM [12] found that dexmedetomidine as a bolus dose of 1 µg/kg diluted to a total volume of 20 ml with normal saline (0.9%) for 10 min through an infusion pump prior to the induction of anesthesia efficiently blunted the hemodynamic stress response due to laryngoscopy and intubation and perioperative hemodynamic stability in patients undergoing neurosurgery.

Nagat S. El- Shmaa et al [5,6] observed bradycardia and hypotension after labetalol group. whereas none of the patients had bradycardia or hypotension requiring intervention in the dexmedetomidine group. These results are in accordance to the findings in our study.

Conclusion

We concluded that in head injury patients Dexmedetomidine infusion is better than infusion of Labetalol in suppressing the sympathoadrenal reflex activity for attenuation of hemodynamic response (hypertension and increased heart rate), to laryngoscopy and endotracheal intubation without any deleterious

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