Attenuation of Haemodynamic Responses to Laryngoscopy and Intubation: A Clinical Study of Dexmedetomidine

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ABSTRACT

Introduction: The process of Laryngoscopy and intubation are deleterious stimuli which causes a period of haemodynamic stress and is related with extreme sympathetic activity marked by increased in heart rate and blood pressure. The aim of the study was to evaluate and compare the efficacy of single premedication dose of dexmedetomidine 01micro gram/kg i/v in attenuation of haemodynamic responses to laryngoscopy and endotracheal intubation.

Material and Methods: After institutional ethical committee clearance, 120 patients between the age group of 20 and 50 years, belonging to ASA class 1 and 2, and scheduled for general surgeries under general anaesthesia, were randomized into groups –D and N, having 60 patients each. Groups -D and N were premedicated with Inj.dexmedetomidine and 0.9% Normal saline respectively and their haemodynamic parameters measured before and after intubation and thereafter, at regular intervals noted. Any intra operative adverse effects were noted.

Results: No statistical differences could be drawn between both the demographic profile of the patients and ASA grading. SBP, DBP, MAP,HR were significantly higher in group N than in group D.Group D showed more cardiovascular stability than group N.

Conclusions: Use of dexmedetomidine resulted in less cardiovascular instability to laryngoscopy and endotracheal intubation.

Keywords: Haemodynamic, Laryngoscopy, Intubation

INTRODUCTION

Since the introduction of endotracheal anaesthesia in the last quarter of 19th century, endotracheal intubation has become one of the common procedure in the practice of anaesthesia.

The process of Laryngoscopy and intubation are deleterious stimuli which causes a period of haemodynamic stress and is related with extreme sympathetic activity marked by increased in heart rate and blood pressure.[1] These changes in heart rate and blood pressure are transient and unpredictable. Healthy individuals can sustain this response well but in vulnerable individuals, this sympathetic response can produce worst conditions.[1,2] Therefore, to blunt these unwanted responses, multiple pharmacological and nonpharmacological measures were taken to minimize the hemodynamic adverse response at different time.

Several methods were tried to blunt the sympatho adrenal responses, but none of the measures taken were completely effective. Dexmedetomidine is a highly selective α2 receptor agonist with an α2:α1 specificity of 1620:1.[3] The properties of this drug,which are sedative, hypnotic and antinociceptive are due to its agonism of the presynaptic α2 adrenergic receptors which is situated in the locus coeruleus, which blocks the release of norepinephrine, thus terminating the pain signals and inhibits sympathetic activity which contributes in decreasing the blood pressure and heart rate.

Hence considering the adverse effects associated with laryngoscopy and intubation, dexmedetomidine have been chosen to find out its effectiveness in obtunding the hemodynamic responses arising from laryngoscopy and endotracheal intubation.

The aim of the study was to evaluate and compare the efficacy of single premedication dose of dexmedetomidine.

In obtunding haemodynamic responses to laryngoscopy and endotracheal intubation, and Side effects, if any.

MATERIAL AND METHODS

After taking the clearance of the hospital ethical committee and consent,120 patients of both sex of age between 20 to 50 years of ASA-1 and ASA-2 undergoing elective general surgical procedures in Assam Medical College from July 2014 to June 2015, were divided randomly by sequentially numbered opaque sealed envelope method, into two groups of 60 patients each.

Group D- Injection Dexmedetomidine 1 micro gram/kg body weight intravenous diluted in 100ml 0.9% normal saline which was to be given in 10 mins, 15 mins before laryngoscopy and intubation.

Group N- Receiving 0.9% normal saline 15 mins before laryngoscopy and intubation.

ASA III and above and also history of difficult intubation were exempted from the study.

Pre-anaesthetic check ups was done in all patients including detailed history of the disease, physical examination and routine investigations. The procedure of the study was explained to all the patients. Informed and written consent were taken. All patients were kept nil per orally for 6 hours before surgery.

Soon after arrival of the patient at the operating room, all standard monitoring devices were connected. Pulse oximeter, electrocardiogram, non invasive blood pressure were measured. An intravenous line was established with 18 gauge canula and 200 ml of RL was administered before administration of the study drugs.The patient was premedicated with glycopyrrolate (0.005 mg/Kg) IV, ondansetron (4mg) IV, ranitidine (50mg) IV and tramadol (1.5mg/kg) IV.

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Time interval	HR (Mean)	SBP (Mean)	DBP (Mean)
TI	82.01	123.26	77.28
T2	72.02	114.22	69.43
T3	81.40	124.05	75.93
T4	78.8	119.26	70.06
T5	76.73	116.35	65.33
T6	76.2	116.11	64.00
T7	76.3	115.35	72.23
Group D: Haemodynamic parameters			

Time interval	HR (Mean)	SBP (Mean)	DBP (Mean)
T1	78.95	120.50	80.2
T2	75.22	110.31	79.96
T3	87.06	127.4	88.96
T4	84.03	123.1	87.13
T5	82.23	118983	84.3
T6	79.56	120.06	82.1
T7	79.68	119.48	82.2
Group N: Haemodynamic parameters			

Preoxygenation was done with 100% oxygen for 3-5 mins before induction with a appropriate sized face mask. Induction was done with Inj. Propofol (2mg/kg) IV and administered slowly till the loss of eyelash reflex was established, followed by administration of Inj. Succinylcholine at a dose of 1.5 mg/kg IV.

Plan of study

Patient's Pulse Rate, NIBP (systolic, diastolic Blood Pressure), SpO2, were monitored, before the administration of study drug (T1), Immediately after administration of study drug(T2), immediately after intubation (T3), then after at 3 min (T4), 5 min(T5), 10 min(T6) and 20 min(T7) after intubaton.At the end of the surgery, reversal was done with inj Neostigmine 0.05mg/kg and inj. Glycopyrrolate 0.01mg/kg IV. Extubation was done after evaluating adequate reversal of non depolarizing muscle relaxant.

An observation was made in relation to adverse effects of drugs and also anaesthesia related problems, if any and were attended to appropriately.

STATISTICAL ANALYSIS

Student 't' test and Fisher's exact test were used for statistical analysis wherever applicable. p value of less than 0.05 was considered significant.

RESULTS

The mean age of patients in group D was 39.13±7.51 years and in group N it was 39.27±7.45 years with a p value more than 0.05 and hence both the groups were comparable in relation to age distribution. In Group D, 38.33% were males and 61.67% were females and in Group N, 58.33% were males and 41.67% were females. Hence, both the groups were comparable in relation to sex distribution. The mean weight of patients in Group D was 46.81±8.89 kg and in Group N was 48.56±7.56 kg with p value of more than 0.05 which is not significant and hence both the groups were comparable.

There was a significant increase in Heart Rate immediately after intubation in Group N which was 11.85/min. whereas in Group D it was only 9.37/min. This was statistically significant.

The intra operative values of heart rate was found to be more stable in Group D than that of Group N. The maximum rise in SBP immediately after intubation was 17.09 mmHg in Group N and 9.83 mmHg in Group D. This shows that obtunding the rise in Systolic Blood Pressure is better with dexmedetomidine, than Normal saline. The SBP were found to be more stable in Group D than Group N during intra-operative period. There was a maximum rise in diastolic blood pressure immediately after intubation which was found to be 9 mmHg in Group N and 6.5 mmHg for Group D. This shows that hemodynamic effects was better maintained in Group D during laryngoscopy and intubation.

Side effects

Bradycardia was noticed in few patients in dexmedetomidine group, which was treated with inj. Atropine. But was not statistically significant.

DISCUSSION

Demographic profile in both the groups were comparable,hence statistically insignificant. Immediately after laryngoscopy and intubation, there was an increase in mean HR in both the groups. It measured 81.40 /min in Group D and 87.06 /min in Group N. The increase was more in group N than the Dexmedetomidine group. Dexmedetomidine obtunded the pressor response better. Similarly, mean Systolic Blood Pressure showed an increase measuring 124.05 mm Hg and 127.4 mm Hg in Group D and N respectively. It showed that the increase in SBP was much more in case of Normal saline than in Dexmedetomidine group. It was statistically significant.

Distolic Blood Pressure also showed a increase to a mean value of 75.93mm Hg in Group D and 88.96 mm Hg in Group N. The rise in Distolic Blood Pressure was more so in the Normal saline group. Dexmedetomidine was found to be better in obtunding the pressor responses.

Comparing our study with,Arindam sarkar et al[4], they observed that dexmedetomidine showed better response in attenuation of heamodynamic responses to laryngoscopy and intubation.The result of our study tally with the results of this study, where dexmedetomidine showed better responses to the pressor response during laryngoscopy and intubation.

In an another study, Anish Sharma NG[5],compared both clonidine and dexmedetomidine and found that dexmedetomidine was more effective in attenuating the tachycardia response. This was in favour of our study where dexmedetomidine in a dose of 1 microgram showed better responses in suppressing pressor responses to laryngoscopy and intubation.

Vinit Kumar Srivastava et al[6] also concluded that dexmedetomidine was better than esmolol in attenuation of heamodynamic responses to laryngoscopy and intubation. Keniya et al.[7] conducted a double blind controlled study to assess the efficacy and safety of dexmedetomidine in attenuating sympathoadrenal responses to tracheal intubation and to analyse reduction in perioperative anaesthetic requirement. In 2012, Sukhminderet al[8], conducted a prospective randomized controlled study to investigate the haemodynamic effect of intravenous dexmedetomidine as an adjunct to anaesthetic induction to attenuate haemodynamic response to endotracheal intubation and dose sparing of opioid and isoflurane to achieve adequate analgesia and anaesthesia. Ramesh kumar et al[9] in

2014 selected Sixty patients scheduled for elective general surgery under general anaesthesia. Authors concluded that dexmedetomidine 1mcg/kg is more effective in attenuating hemodynamic pressure responses to laryngoscopy and intubation than 2mcg/kg fentanyl when given as premedication. In 2014, Siddareddigari Velayudha Reddy et al[10] concluded that dexmedetomidine showed better results than esmolol in attenuation of heamodynamic responses to laryngoscopy and intubation.

CONCLUSION

Based on the findings of our study, we can come to a conclusion that Inj. Dexmedetomidine at a dose of 1mcg/kg IV administered 15 minutes prior to the process of laryngoscopy and intubation was able in obtunding haemodynamic changes during elective surgeries under general anaesthesia. It was also seen that Dexmedetomidine maintained a stable haemodynamic profile during intra-operative period. Heart rate, systolic and diastolic blood pressure were maintained within range by dexmedetomidine. Hence we can conclude that Dexmedetomidine at a dose of 1mcg/kg i/v administered as a single bolus dose 15 minutes prior to laryngoscopy and intubation can attenuate the sympathetic response to laryngoscopy and intubation in patients undergoing elective surgeries under general anaesthesia.

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