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ATTENUATION OF HEMODYNAMIC RESPONSE TO LARYNGOSCOPY AND ENDOTRACHEAL INTUBATION WITH INTRAVENOUS DEXMEDETOMIDINE IN PAEDIATRIC AGE GROUP

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ABSTRACT Laryngoscopic manipulation and endotracheal intubation are noxious stimulus capable of producing tachycardia, arrhythmia, bronchospasm, larygospasm and hypertension.Dexmedetomidine is an Alpha 2 agonist with documented stress attenuation property. Dexmedetomidine has been seldom studied in Paediatric age This study was conducted in a view to find out the optimal dose of Dexmedetomidine for stress attenuation. To attenuate the hemodynamic response to laryngoscopy and endotracheal intubation with 3 different doses of intravenous Dexmedetomidine in Paediatric age group and to find out the optimal dose required for it. Paediatric patientswith sample size 90 undergoing Enucleation & Curettage for Adenotonsillitis, were enrolled for the study. Patients were divided into 3 groups (30 each) receiving: Group A 0.5mcg/kg of Dexmedetomidine. Group B 0.75mcg/kg of Dexmedetomidine. Group C 1mcg/kg of Dexmedetomidine. It was given as 20ml infusion over 10mins.The hemodynamic response was better obtunded in Group B and Group C, when compared with Group A.There was no clinically significant difference between Group B and Group C in any of the parameters at any point of time. So the dose of 0.75mcg/kg of dexmedetomidine is adequate to produce desired stress attenuation with minimal side effects compared to 1mcg/kg. Dexmedetomidine in a dose of 0.75mcg/kg is the optimal dose to attenuate stress response to larygngoscopy and endotracheal intubation with minimal adverse effects.

KEYWORDS : dexmedetomidine, laryngoscope,paediatric,endo tracheal intubation

1.INTRODUCTION :

Induction of general anaesthesia, laryngoscopy, tracheal intubation, and extubation are associated with various haemodynamic changes. Laryngoscopy and tracheal intubation may be associated with sympathetic stimulation and lead to tachycardia and hypertension. These haemodynamic changes may predispose to myocardial ischaemia.Therefore, there is a need to blunt these noxious responses effectively. Various drug combinations have been used with variable success to attenuate the sympathetic responses during laryngoscopy and intubation .remedication is usually administered to reduce anxiety, easy parental separation, amnesia and to reduce anaesthetic requirements. An ideal premedication should have anxiolytic, sedative, analgesic and antisialagogue property. It preferably should be short acting, rapid onset, administered non-parenterally and devoid of any adverse haemodynamic or respiratory effect.Dexmedetomidine (DEX), a highly selective, short-acting, alpha2-adrenoreceptor agonist, has sedative, analgesic and anxiolytic property without any respiratory depressive action. It is an ideal agent for relieving anxiety or nervousness before anaesthesia. It is established that preoperative intravenous (IV) DEX can successfully attenuate the laryngoscopic stress response.However, adverse haemodynamic complications like hypotension, bradycardia and even cardiac arrest might have hindered the widespread use of IV DEX. Delayed recovery with IV DEX is also documented due to its sedative effect. It has been suggested that alternative routes other than rapid intravenous delivery may help to minimise the adverse effects of DEX.hence this study was planned to attenuate the hemodynamic response to laryngoscopy and endotracheal intubation with 3 different doses of intravenous Dexmedetomidine in Paediatric age group and to find out the optimal dose required for it.

2.METHODS AND MATERIALS

Randomised Prospective Double blinded study.Institutional Ethical Committee clearance was obtained.Paediatric patients undergoing Enucleation & Curettage for Adenotonsillitis, were enrolled for the study.Sample size = 90 was selected after doing pilot study.Informed written consent from the parents were obtained

Patients were divided into 3 groups (30 each) receiving:

- **Group A 0.5mcg/kg** of Dexmedetomidine.
- **Group B 0.75mcg/kg** of Dexmedetomidine.
- **Group C 1mcg/kg** of Dexmedetomidine.

It was given as 20ml infusion over 10mins

INCLUSION CRITERIA

- AGE 8 TO 12YRS
- Male and female
- ASA 1
- Elective surgery

EXCLUSION CRITERIA

- Age <8yrs & > 12yrs
- ASA 2 and above
- Bronchial asthma
- Seizure disorder
- Anticipated Difficult airway
- Intubation time > 15sec

Procedure :

- Premedicated with Inj glycopyrrolate iv
- Determined dose of study drug was infused (20ml) over 10min.
- Vitals were monitored
- GA technique was standardised for all three groups
- Intubated orally with appropriate size ETT.
- After surgery, patients were extubated and post operative sedation score was assessed.
- After completion of infusion, sedation was assessed at 2, 5 & 10mins using Ramsay sedation score.
- Hemodynamic variables: HR, SBP, DBP and MAP were recorded Preinduction, 1st min, 3rd min and 5th min after intubation.
- Vitals were recorded every 5 minutes in the intraoperative period.
- After reversing the patient, post operative sedation score was assessed at the 5th minute.

Statistics

Groups were matched for their demographic data.Statistical data were collected and analysed using SPSS version 15.Results on continuous measurements are presented as Mean ± SD. Significance level was assessed at 5%Statistical significance was tested using ANOVA.P value <0.001 was considered significant. Post hoc Tukey test was used to find pair wise significance.P value <0.05 was considered significant

3.Results: Table No 1: Heart Rate Difference

HR (beats/min)	Group A	Group B	Group C	P Value
Baseline	84 ±5.67	86.5±5.30	85.5±5.28	0.672
1min	116±5.8	90.2±5.41	88.2±5.51	<0.001
3min	108±4.63	88.72±4.95	84.82±5.40	<0.001
5min	96±5.08	84.47±4.65	79.02±5.8	<0.001

Table No 2: Systolic B.p Difference

Systolic BP (mmHg)	Group A	Group B	Group C	P value
Baseline	110.07 ±7.90	108.58±5.70	109.5±5.51	0.660
1min	139.12±5.14	114.70±5.86	112.23±5.40	<0.001
3min	128.54±5.87	109.72±5.10	104.27±5.49	<0.001
5min	118.50±4.94	106.80±5.48	103.35±5.08	<0.001

Table No 3: Diastolic B.P Difference

DBP (mmHg)	Group A	Group B	Group C	P value
Baseline	72.83 ±5.36	71.58±5.70	70.72±5.51	0.266
1min	87.12±5.14	74.67±5.86	73.23±5.40	<0.001
3min	85.18±4.97	71.72±5.10	69.27±5.49	<0.001
5min	82.52±5.01	70.80±5.48	66.47±5.08	<0.001

Table No 4: Mean Arterial Pressure Difference

MAP (mmHg)	Group A	Group B	Group C	P value
Baseline	85.24±6.36	83.91±5.70	83.64±5.51	0.639
1min	104.45±5.14	88.01±5.86	86.23±5.40	<0.001
3min	99.63±4.97	84.38±5.10	80.93±5.49	<0.001
5min	94.51±5.01	82.80±5.48	78.76±5.08	<0.001

Table 5 : Post Op Sedation Score

Sedation Score	Group A	Group B	Group C
1	22 (66%)	0	0
2	8 (24%)	9 (27%)	0
3	0	21 (63%)	11 (33%)
4	0	0	19 (57%)
5	0	0	0
6	0	0	0

4.Discussion &conclusion :

Attenuation of laryngoscopic stress response is a major challenge for anaesthesiologist. The satisfactory role of preoperative DEX for attenuation of laryngoscopic stress responses is well established. Nowadays besides IV route, use of IN DEX as premedication is becoming popular, specially in paediatric population. DEX, a centrally acting α2agonists, is widely used in the intensive care unit for its unique sedative, hypnotic, anxiolytic, sympatholytic, antisecretory and analgesic properties. It has unique pharmacological property of conscious sedation and is devoid of any respiratory depression. It is responsible for producing dose dependant co-operative sedation that allows early interaction and early postoperative neurological assessment. Dex also has a reversal drug for its sedative effect called as atipamizole, which acts by increasing the central turnover of noradrenaline. Due to all of these specific characteristics, nowadays DEX become popular as an ideal premedication agent.DEX inhibits noradrenaline release and causes sedation and hypnosis through presynaptic central α2 receptor in the locus ceruleus. The sympatholytic activity of DEX is mediated through postsynaptic α2 receptor which prevents tachycardia and hypertension. Due to this sympatholytic property, both IV and IN DEX in our study can successfully attenuate the laryngoscopic stress responses.Dex can be administered through various routes like intravenous, intramuscular, intranasal or intraoral. The intranasal route is more convenient as it is painless, odourless and tasteless without need of any intravenous infusion. Intranasal drug can penetrate the blood–brain barrier and reach the central nervous system directly. Due to the higher vascularity of the nasal mucosa, DEX may access the systemic circulation rapidly, bypassing the first-pass metabolism of liver.The basal readings of HR, SBP, DBP and MAP were similar in all 3 groups. Maximum intubation response was seen at 1 min post-intubation in all the three groups.Group A had statistically higher values of HR, SBP, DBP and MAP at all time intervals post-intubation when compared to Group B and Group C. In Group B(0.75mcg), the variables approached near the baseline by 3 min.In Group C(1mcg), the variables fell below the baseline by 3 min.Hence, it can be inferred that the hemodynamic response was better obtunded in Group B and Group C, when compared with Group A.There was no statistically significant difference between Group B and Group C in any of the parameters at any point of time. A study by Gulabani et al, observed Dexmedetomidine 1mcg/kg was more effective than 0.5mcg/kg.[1] Our study has shows that an intermediate dose of 0.75mcg/kg is similarly effective with minimal side effects. A study by Manne et al, observes the increased sedative effect of Dexmedetomidine in dose of 1mcg/kg with the need of oxygen supplement.[2] In our study, we needed didn't need any oxygen supplementation post operatively. Hemodynamic data couldn't be recorded as a continuous variables.The risk of aspiration couldn't be quantified. The hemodynamic response was better obtunded in Group B and Group C, when compared with Group A.There was no clinically significant difference between Group B and Group C in any of the parameters at any point of time.So the dose of 0.75mcg/kg of dexmedetomidine is adequate to produce desired stress attenuation with minimal side effects compared to 1mcg/kg.

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