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Original article.

COMPARATIVE STUDY OF DEXMEDETOMIDINE OR MGSO4 TO ATTENUATE HEMODYNAMIC STRESS RESPONSE TO LARYNGOSCOPY AND INTUBATION

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ABSTRACT

BACKGROUND: For General anaesthesia, Endo-tracheal intubation is done
Sent from Yahoo Mail on Android usually due to that catecholamine released & deleterious haemodynamic response there . to prevent that alpha agonist dexmedetomidine & NMDA antagonist MgSO4 was used.
AIM: to prevent stress response by both pharmacological agents **MATERIAL & METHODS**:
Both dexmedetomidine 1mcg/kg & MgSO4 30mg/kg 50% were given over 10 min slowly before induction. HR, SBP, DBP were measured at -. After intubation **Results**: both decrease Stress response **CONCLUSION**:
Dexmedetomidine decreases stress response in comparison to MgSO4 as MgSO4 causes mild tachycardia.

Key words : dexmedetomidine , mgso4 ,hemodynamic stress, laryngoscopy, intubation

INTRODUCTION

Endo-tracheal intubation is a safe technique for conduction of general anaesthesia, in that it offers protection to the airway with Endo-tracheal tube cuff and facilitates effective positive pressure ventilation. Stress response under anaesthesia has long been universally recognized phenomenon which may be in the form of Endo-tracheal or autonomic disturbance. There is increase in heart rate, blood pressure and arrhythmias.[1]

The response to laryngoscopy and intubation can be either laryngovagal or laryngosympathetic. The laryngovagal response is generally seen in paediatric patients in the form of bradycardia, laryngeal spasm and bronchospasm. The most common laryngosymathetic response seen in adolescents and adults is tachycardia and hypertension which can be detrimental in some patients.[1,2]

These changes are maximum at 1 min after intubation and last for 5-10mins. Attempts were made as early as 1960s by various investigations to reduce the sympathetic response to laryngoscopy and intubation. These include

1. Deepening the plane of anaesthesia with inhalation and intravenous anaesthetic agents.[3]
2. Decreasing the duration of laryngoscopy to less than 15 seconds.
3. Usage of drugs like lidocaine, sedatives, vasoactive drugs like sodium nitropruside, calcium channel blockers, nitroglycerine and other drugs especially α_2 agonist like clonidine and dexmedetomidine.[4]

Intravenous dexmedetomidine, a central α_2 agonist is being used in anaesthesia practise as a premedicant. The advantage of dexmedetomidine as a premedicant in anaesthesia setting include sedation, analgesia, anxiolysis and to improve haemodynamic stability.[5]

Magnesium is a naturally occuring clacium antagonist and a non-competitive antagonist of N-methyl D aspartate (NMDA) recepter.[6]

Most studies suggest that perioperative MgSO4 controls cardiovascular response to tracheal intubation[7] reduces anaesthetic requirement[8] and has opoid sparing effect in perioperative period.[9]

The aim of the study is to compare effectiveness of dexmedetomidine 1µg/kg and MgSO4 in attenuating cardiovascular response during laryngoscopy and intubation in ASA I and ASA II patients of AMC MET college, Ahmedabad.

MATERIAL AND METHOD:

The objective of the present study is to determine and compare effectiveness of IV dexmedetomidine 1µg/kg and MgSO4 in attenuating haemodynamic response to laryngoscopy and intubation. The study protocol was approved by the institutional ethical committee and written informed consent was obtained from all the patients.

This was a randomised double blind prospective study with 50 ASA class I and II patients aged 20-60 years of average weight of 40-60 kg of various elective surgeries divided into 2 groups. All the patients were kept nil per oral 10 hrs prior to surgery.

Group I (n-25) will receive 1µg/kg body weight of dexmedetomidine intravenously.

Group II (n-25) will receive 30mg/kg body weight of MgSO4 intravenously.

Inclusion criteria:

- Healthy adult patients aged between 20-60 years posted for elective surgeries.
- Patients belonging to ASA class I and II.

Exclusion criteria:

- Patients of paediatric and geriatric age group.
- Patients belonging to ASA class III and above.
- Patients with difficult airway and obese patients.
- Patients coming for emergency surgeries.
- Pregnant patients.

Anaesthesia technique was standardized for both the groups. On the day of surgery, in the operation theatre intravenous line was secured, pulse oxymeter, NIBP, ECG monitor were applied. Baseline parameters heart rate, systolic BP, diastolic BP were noted before administration of any drugs. Patients pre-oxygenated for 3mins then Group I patients were administrated Inj. Dexmedetomidine 1µg/kg over 10mins and group II patients were received MgSO4 30mg/kg over 1min before intubation.

Patients receive premedication in form of Inj. Glycopyrolate 0.2mg, Inj. Ondansetron 4mg, Inj. Midazolam 1 mg, Inj. Fentanyl 2µg/kg. Patients were induced with Inj thiopentone sodium 5mg/kg followed by Inj succinylcholine 2mg/kg to facilitate intubation. Heart rate, SBP and DBP were noted at 0, 1, 2, 3, 4, 5 after intubation. Anaesthesia was maintained with 02, Nitrous oxidesevoflurane and Inj. Vecuronium. At the end of surgery patients were reversed with Inj. Neostigmine 0.05mg/kg and glycopyrolate 0.01mg/kg.

OBSERVATIONS& RESULTS:-

Demographics: Both groups are comparable in age, sex, ASA grade, duration of surgery.

Changes in Heart Rate:

Table 1: Changes in HR			
HR	GROUP D	GROUP M	P value
Baseline	85.24±20.29	98.45±20.3	0.02
0	96.57±14.22	112.80±16.65	0.0009
1	94.52±16.07	108.25±13.70	0.0028
2	90.67±14.17	104.70±16.24	0.0027
3	88.24±14.66	105.80±13.23	0.0001
4	86.43±13.08	104.55±14.21	0.0001
5	85.90±11.63	103.00±15.62	0.0001

Table 2: Changes in SBP			
SBP	GROUP D	GROUP M	P value
Baseline	135.57±19.45	129.55±18.07	0.16
0	142.95±24.58	149.85±25.90	0.19
1	129.14±22.64	132.55±19.85	0.31
2	118.52±21.82	124.50±18.10	0.17
3	113.00±21.07	119.20±17.75	0.16
4	110.00±17.85	113.65±16.91	0.31
5	112.81±18.59	113.55±13.61	0.44

Table 3: Changes in DBP			
DBP	GROUP D	GROUP M	P value
Baseline	82.38±10.49	83.20±10.14	0.40
0	98.48±18.09	105.10±18.01	0.13
1	89.04±16.91	89.70±10.94	0.45
2	81.33±16.60	83.55±12.39	0.32
3	75.71±15.75	79.05±10.85	0.22
4	75.33±14.16	74.05±12.52	0.38
5	76.10±16.14	75.40±13.65	0.44

Table 4 : Rate pressure product changes			
RPP	GROUP D	GROUP M	P value
Baseline	11555.98	12754.19	<0.0001
0	13804.68	16903.08	<0.0001
1	12206.31	13950.88	<0.0001
2	10746.20	13035.15	<0.0001
3	9971.12	12611.36	<0.0001
4	9507.30	11916.20	<0.0001
5	9690.37	11695.65	<0.0001

Discussion

Haemodynamic changes following endo-tracheal intubation are well documented. There are several studies for attenuation of stress response due to laryngoscopy and intubation. Different agents used for the same like IV NTG, esmolol, opioids, vasodilators, calcium channel blockers, IV lignocaine, topical lignocaine and adenoceptor blocking drugs individually or in combination. (1, 2, 3, 4)Deleterious haemodynamic changes due to stress response to intubation include LV dysfunction, HT crisis, pulmonary edema, cardiac arrhythmias, myocardial ischemia, myocardial necrosis.(8, 9,10)

I.V. dexmedetomidine was initially approved by FDA for ICU sedation but due to its unique pharmacological properties it is used for attenuation of stress response. MgSO4 also used for same due to inhibition of catecholamine release from adrenal gland and decrease atrial contraction and vasodilatation due to its calcium antagonist effect.(5, 6)

MgSO4 is highly effective arteriolar vasodilator but with minimum dilatory effect, so maintained cardiac filling and CO.(6,7) Neurophysiological studies demonstrated that MgSO4 is physiopharmacological blocker of N-methyl D-Aspartate(NMDA) receptors in neuronal tissue. Azim Honarmand etal stated that MgSO4 in dose ≤ 50 mg/kg reduces the pressure response to laryngoscopy.(4)

In present study, both D and M group comparable no statistical significant difference with respect to age, weight, gender and type of surgery. Fall in HR was significant at 3, 4, 5 min in group D as compare to group M. Similarly fall in SBP was comparatively more in group D at 3, 4, 5 min than group M. Similarly rate pressure product was less in all baseline, 0, 1, 2, 3, 4, 5 min in group D than group M ($p<0.0001$). So, dexmedetomidine decreases cardiac energy requirements better than MgSO4. Our results correlate with study of Kemiya etal, who found fall in both HR and BP in group D. In Jaakola's study fall was high due to higer dose of dexmedetomidine. We have noticed 18-20% decrease in SBP, 5% decrease in HR in group D which do not require any pharmacological intervention. (12)

Conclusion

In nutshell, we summarise both agents provide better haemodynamics during intubation but detxmedetomidine was more effective than MgSO4 in attenuation of CVS response to MgSO4. Limitation of our study was there is no control group as we want to prevent pressure response in all patients.

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