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A Comparative Study to Evaluate the Attenuation of Pressor Response During Laryngoscopy and Tracheal Intubation Under General Anaesthesia with I.V. Magnesium Sulphate (20mg/Kg) (Vs) I.V. Lignocaine (1.5mg/Kg): A Prospective, Controlled, Randomized and Double Blinded Study.

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Abstract:
Background: *Attenuation of pressor response during laryngoscopy and tracheal intubation under general anaesthesia with i.v. magnesium sulphate (20mg/kg) (vs) i.v. lignocaine (1.5mg/kg)*
Aim: *A comparative study to evaluate the attenuation of pressor response during laryngoscopy and tracheal intubation under general anaesthesia with i.v. magnesium sulphate (20mg/kg) (vs) i.v. lignocaine (1.5mg/kg).*
Methods: *After obtaining institutional ethical committee approval and informed consent, 50 people belonging to both sexes of ASA grade I / II aged 18 yrs - 50yrs were randomly allocated into 2 groups, Group 1 and Group2 of 25 each.*

- *Group 1 : IV MgSO4 (20mg/kg) Study Group*
- *Group 2 : IV 2% Lignocaine (1.5mg/kg) Control Group*

Results: *In this study, Heart rate, systolic blood pressure, Diastolic blood pressure & Mean arterial pressure are studied in 1min, 3min, 5min. during laryngoscopy and intibation.*

- *Heart rate tended to ↑ after Lidocaine and MgSO4 administation and ↑ in Heart rate was significant in the lignocaine group when compared to MgSO4 group.*
- *Heart rate further ↑ after endotracheal intubation in both the groups.*
- *Immediately after intubation and 3 min post intubation from baseline the ↑ Heart rate was significant in both the groups but more significant in the control group.*
- *Systolic blood pressure and MAP ↑ 1 and 3 min after tracheal intubation in both the groups.*
- *The ↑ in SBP and MAP was significant in the lignocaine group 1 and 3 mins than MgSO4 group. Post intubation (P<0.05) significant.*
- *Changes in the HR, SBP & DBP returned to near baseline with in 3-5 mins in MgSO4 group.*

Conclusion: *Our study demonstrated that I.V. MgSo4 20mg/kg significantly attenuated the pressor response to laryngoscopy & intubation in comparison with I.V. lidocaine 1.5mg/kg in various surgeries posted under General anaesthesia without significant side effects.*
Keywords: *I.V. Magnesium Sulphate, I.V. Lignocaine, Pressor response, Laryngoscopy and intibation.*

I. Introduction:

Laryngoscopy and tracheal intubation violate the patients protective airway reflexes and lead to adverse hemodynamic & cardiovascular responses like tachycardia, HTN due to sympathetic stimulation and release of catecholamines, which are detrimental to the patients posted for various surgeries under GA. The standard technique of laryngoscopy and endotracheal intubation involves the stimulation of Larynx, Pharynx, Epipharynx and trachea, which are extensively innervated by Autonomic nervous system, namely the parasympathetic innervation via vagus and glossopharyngeal nerves and sympathetic via superior cervical ganglion.

- Several agents like I.V. Lignocaine, beta blockers, alpha2 receptor agonists like clonidine, Dexemeditomidine, Esmolol, opiods like (Fentanyl, Sufentanyl, Alfentanyl, etc) calcium channel blockers, NTG, were tried to obtund the pressor response.
- Recently, the role of magnesium has been evaluated for different purposes for anesthetic and Intensive care units.
- We have undertaken this study to assess the efficacy of intravenous Magnesium sulphate as premedication in attenuating the pressor response to laryngoscopy and intubation in a group of

Normotensive patients, mild hypertensive patients compared to the control group with intravenous preservative free Lignocaine.

II. Magnesium Sulphate:

- Mg is the fourth most common mineral salt in the humans and 2nd most intracellular cation. Mg is used in obstetrics, and perioperative analgesia and in emergency medicine.
- It has calcium antagonist effects, is involved in the regulation of different ion channels and phosphorylation reactions and serve as cofactor in many enzymatic reactions
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- Mg attenuates stress response to laryngoscopy and intubation by blocking catecholamines from adrenergic nerve terminals and adrenal gland.
- Presynaptic release of Ach is ↓ by high Mg Concentration and also Mg ↓ the effects of Ach on post synaptic receptors there by altering neuromuscular transmission.
- Mg is coronary and peripheral vasodilator and is used in the treatment of cardiac rhythm disorders.
- The property of Mg as an antagonist of NMDA receptor is basis for studies of its adjuvant effect in perioperative analgesia.
- Inhibitory action of Mg on smooth muscle contraction, histamine release from mast cells and Ach release from cholinergic nerve terminals are the postulated mechanisms for bronchodilator effects.
- It acts as a tocolytic and produces cerebral vasodilatation which could account for its anticonvulsant action in patients with pre-eclampsia and eclampsia.

Pharmacology:

- 55% to 75% of ingested Mg normally is absorbed.
- The main route of Mg loss is through the kidneys.
- Elimination half life is 43.2 hours.

Lignocaine:

- Lignocaine is a voltage gated sodium channel blocker preventing channel activatiion and interfering with large transient Na influx associated with membrane depolarization.
- IV Lignocaine 1.5mg/kg has been proved to attenuate stress responses during laryngoscopy and intubation when given prior to induction.

Aim:

Our aim is to evaluate the efficacy of I.V. MgSO4 (20mg/kg) for attenuation of pressor response during laryngoscopy and intubation under GA in comparison with IV Lignocaine (1.5mg/kg).

III. Materials And Methods:

Source Of Data

This study was carried out in the Department of anaesthesiology, Government General Hospital, Guntur medical college, Guntur. The study was approved by the local ethical committee. The protocol of the study was reviewed and approved by Dr NTR UNIVERSITY OF HEALTH SCEINCES.

Method Of Collection Data:

- After obtaining institutional ethical committee approval and informed consent, 50 people belonging to both sexes of ASA grade I / II aged 18 yrs - 50yrs were randomly allocated into 2 groups, Group 1 and Group2 of 25 each.
- Group 1 : IV MgSO4 (20mg/kg) Study Group
- Group 2 : IV 2% Lignocaine (1.5mg/kg) Control Group
- Different types of operations performed on patients were Neurosurgical operations, Thyroid surgeries, Operations breast, Orthopedic operations, Gynaecological operations etc..

Inclusion Criteria:

- ASA grade I and II physical status
- Patient requiring general anaesthesia and not on elective ventilation.

- Age between 18-60yrs, belonging to both sexes.
- Weight 50-100 kgs.

Exclusion Criteria:

- Known Hypertensives or unstable blood pressure SBP <70 & >150.
- Poor Left ventricular function
- Emergency Surgery
- Diabetics
- Difficult Airway
- Impaired renal function and electrolyte imbalance.

IV. Methodology

- Group1: Received IV MgsO4 20mg/kg before induction.
- Group2: Received IV lignocaine 1.5mg/kg before induction.
- The baseline parameters of both groups Pulse Rate, Systolic arterial pressure, Diastolic arterial pressure, MAP, SPO2 (continuously) recorded.
- I.V. line secured, all standard monitors like ECG, SPO2, NIBP, TEMP connected to all patients.
- All patients are premedicated with inj Glycopyrrolate 5mic/kg I.V. and inj. Fentanyl 1mic/kg I.V.
- Thiopentone sodium I.V. 5-6mg/kg and intubated with Suxamethonium I.V. 1.5mg /kg.Maintenance was done with inj. vecuronium 0.1mg/kg I.V. and Oxygen and N2O were maintained to 33:66%.
- Intubation was done with appropriate sized portex cuffed Endo Tracheal tube with Macintosh blade by a Senior PG who was unaware of the study drug. In all patients intubation was done smoothly without any complications.
- PR, SBP, DBP, MAP. were recorded 5min.before induction, 1min before laryngoscopy & intubation &1,2,3,4,5,10,15min after intubation. Surgery was started 10min after intubation.
- At the end of surgical procedure, in all the pts neuromuscular blockade was reversed with Inj. Neostigmine (0.05mg/kg) & inj.Glycopyrrolate (0.005mg/kg) I.V.
- The results of both groups were compared and statistically analysed.
- The analysis for intra individual variability was done with Anova test and continuous data were analysed by student t-test.

V. Results

All the 50 patients enrolled completed the study.

Both groups were similar in their demographic profile and baseline haemodynamic parameters like HR, SBP, DBP and MAP.

Demographic Data:

		Group-1 (Mg)	Group-2 (L)
Age (Mean + SD)	:	33.8 +	36.8 +
Sex (M:F)	:	16:9	8:17
Weight (in Kgs)	:	55.7 +	52+
ASA Status	:	I / II	I / II

Data were expressed as Mean + SD. P value >0.05 is considered not significant.

Baseline Haemodynamic Parameters:

	MgSO4	Lignocaine
HR	78.40	82.00
SBP	114.13	116.93
DBP	80.67	80.40
MAP	91.820	93.82

Data expressed as Mean + SD in both groups. P>0.05 statistically not significant.

Hemodynamic Changes Of I.V. Mgso4 (20mg/Kg) And I.V. Lignocaine (1.5mg/Kg):

MgSO4:

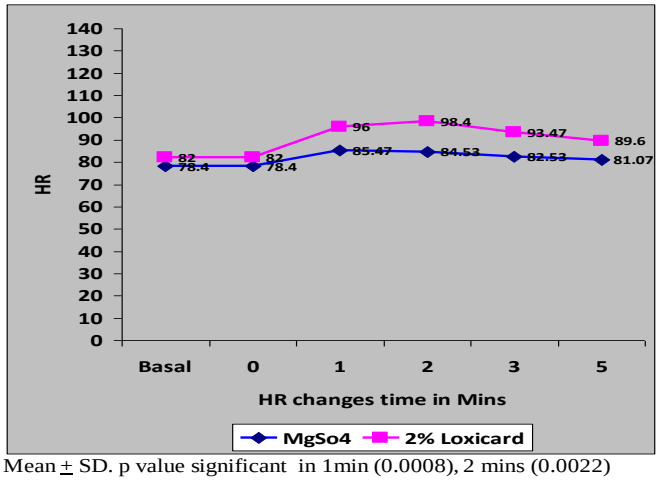
	HR (bpm)	SBP (mm Hg)	DBP (mm Hg)	SPO2 (%)
Baseline	78.40	114.13	80.67	99-100
1 Min	85.47	127.20	83.07	99-100
3 Mins	82.53	120.13	90.67	98-99
5 Mins	81.07	114.13	88.11	99-100

I.V. Lignocaine:

	HR (bpm)	SBP (mm Hg)	DBP	SPO2 (mm Hg) (%)
Baseline	82.00	116.93	80.40	99-100
1 Min	96.00	134.67	88.80	99-100
3 Mins	93.47	125.87	96.04	98-99
5 Mins	120.53	120.53	94.08	99-100

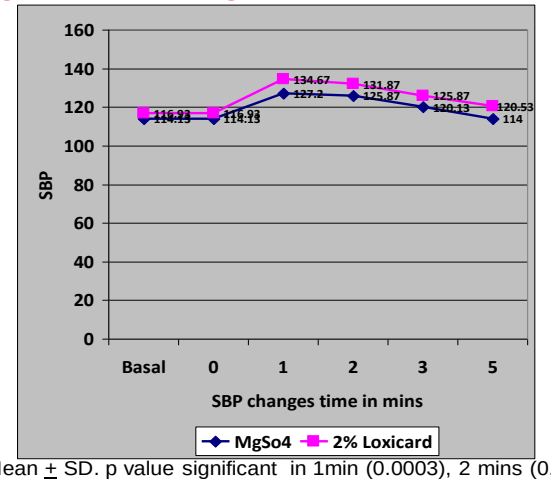
- Heart rate ↑ after MgSO4 administration, but not significantly.
- Heart rate tended to ↑ after Lidocaine and MgSO4 administation and ↑ in HR was significant in the lignocaine group when compared to MgSO4 group.
- Heart rate further ↑ after endotracheal intubation in both the groups.
- Immediately after intubation and 3 min post intubation from baseline the ↑ HR was significant in both the groups but more significant in the control group.
- SBP and MAP ↑ 1 and 3 min after tracheal intubation in both the groups.
- The ↑ in SBP and MAP was significant in the lignocaine group 1 and 3 mins than MgSO4 group. Post intubation ($P<0.05$) significant.
- Changes in the HR, SBP & DBP returned to near baseline with in 3-5 mins in MgSO4 group.
- Changes in the HR, SBP & DBP returned to near baseline with in 10 mins in lignocaine.

MgSO4 and Lignocaine HR changes

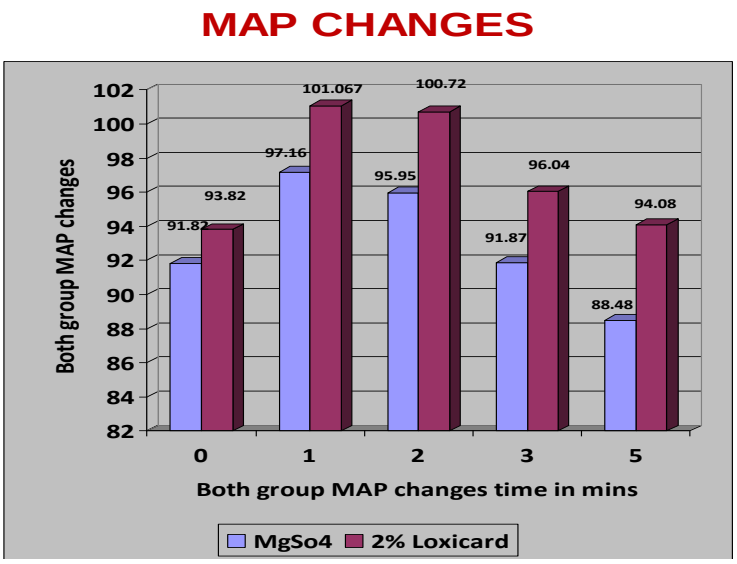


MgSO4 Mean ± SD. p value significant in 1min (0.0008), 2 mins (0.0022)
2% loxicard Mean ± SD. p value singnificantly 1 min (0.0085), 2 mins (0.0055), 3 mins (0.0290).

MgSO4 and Lignocaine SBP changes



MgSO4 Mean ± SD. p value significant in 1min (0.0003), 2 mins (0.0013), 3 mins (0.0452).
2% loxicard Mean ± SD. p value singnificantly 1 min (0.0001), 2 mins (0.0001), 3 mins (0.0110).



MAP- Mean Arterial Pressure. Data expressed as Mean + SD in both groups.

Base line MAP 0.0942 P > 0.05 which is not statistically significant.

P value < 0.05. Statistically significant in 1,2, 3 & 5mins.

- The Average requirement of NDMR Vecuronium compared with both groups.
- The dose of Vecuronium is less for magnesium sulphate when compared to Lignocaine group.
- Lesser dose of Vecuronium for magnesium is present but not significant .

VI. Discussion:

- Laryngoscopy and intubation have been shown to result in marked ↑ in Heart rate, Blood pressure & serum catecholamines.

Anaesthesia Analgesia. June 1989; 68(6): 772-6[1].

- Several studies on Lidocaine demonstrated its ability to decrease the cough reflex, control the ↑ in BP & HR occurring with Laryngoscopy and intubation.
- Splinter & cervenko demonstrated that 1.5mg/kg of I.V. Lignocaine could attenuate ↑ in MAP & RPP but not Systolic blood pressure, Diastolic blood pressure & Heart rate.

Academic emergency medicine vol. 8 issue 1.july 2000[2].

- Previous studies concluded that I.V. Lignocaine offered some protection to HTN & Tachycardia associating with Laryngoscopy & Intubation.
- MgSO4, which has calcium antagonist effects & coronary & peripheral vasodilator properties and attenuate the ↑ in HR & BP by reducing the catecholamin release by Adrenal medulla & Adrenergic nerve endings.
- Puri et al., compared the haemodynamic changes during anaesthesia induction and intubation after infusion of Mg (or) Lidocaine & they concluded that the group treated with Mg showed a slight ↑ in MAP & SVR & No ↓ in cardiac output as compared to the Lidocaine group, with equally good control of Heart rate.

Can J. Anaesth 2003/50:7/Pg. 732-746[3]**.**

- In our study we compared MgSo4 20mg/kg I.V. with I.V. Lignocaine 1.5mg/kg.
- MgSO4 20mg/kg I.V. has been shown to attenuate cardiovascular responses with least complications.

Anaesthesia and Analgesia. 1998; vol 87: 808-11[4]**.**

- Our study showed that I.V. MgSo4 20mg/kg is statistically better than I.V. Lignocaine 1.5mg/kg in attenuating C.V. responses to Laryngoscopy & intubation with favorable Hemodynamic stability.
- The improved control of BP in the MgSo4 group was probably due to a combination of vasodilatory effects of the Mg ion and inhibition of catecholamines.

Journal of Research in Medical Sciences 2005; 10(2): 82-86[5]

- The enhancing effect of MgSO4 20mg/kg I.V. on Neuromuscular Blockade was not seen in our study with the dose.

- Post operative recovery was good in all patients in the Mg group, all patients were extubated on table.
- Two patients in MgSo4 group had Hypotension after 15mins & this was not statistically significant.

VII. Conclusion:

Our study concluded that I.V. MgSo4 20mg/kg significantly attenuated the pressor response to laryngoscopy & intubation in comparison with I.V. lignocaine 1.5mg/kg in various surgeries posted under General anaesthesia without significant side effects.

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