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COMPARISON OF LIGNOCAINE HYDROCHLORIDE AND MAGNESIUM SULPHATE FOR ATTENUATION Of CARDIOVASCULAR STRESS RESPONSE TO LARYNGOSCOPY AND ENDOTRACHEAL INTUBATION

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ABSTRACT

Background: Laryngoscopy, tracheal intubation and subsequent extubation are often associated with an increase in sympathetic response which causes an increase in arterial blood pressure, heart rate, arrhythmias and raised Intracranial Pressure & Intraocular Pressure. Many pharmacological agents have been identified to attenuate the hemodynamic responses associated with intubation and extubation.

Methods: An institutional-based 2-year comparative study between magnesium sulphate and lignocaine hydrochloride on 60 adult patients aged between 18-65 years divided into two groups of 30 each. The hemodynamic parameters like heart rate, systolic, diastolic and mean arterial blood pressure at was compared between the two groups.

Results: Raise in HR, SBP, DBP and MAP at 0 minutes post-intubation (immediately after intubation) were significant in both the groups. The attenuation of the increase in HR and SBP was significantly better with magnesium sulphate compared to lignocaine from 0 minutes post-intubation. At 5 minutes post-intubation SBP and MAP were decreased significantly in the Magnesium Sulphate group, but in Lignocaine group vitals did not decrease significantly though they had taken a decreasing trend. At 10 minutes post-intubation only SBP and MAP were decreased significantly from baseline in Lignocaine group, but in Magnesium sulphate group all the vitals remained decreased.

Conclusion: Our study concludes that Magnesium Sulphate is more effective than Lignocaine Hydrochloride in attenuating cardiovascular response to laryngoscopy and tracheal intubation.

KEYWORDS- INTUBATION; MAGNESIUM SULPHATE; LIGNOCAINE HYDROCHLORIDE

Introduction

Endotracheal intubation is an essential component of general anesthesia. It serves in the maintenance of patency of upper airway, proper ventilation and reduction in the risk of aspiration[1].Laryngoscopy, tracheal intubation and subsequent extubation are often associated with an increase in sympathetic response which causes an increase in arterial blood pressure, heart rate, arrhythmias and raised Intracranial Pressure & Intraocular Pressure.

Since the 1950s, hypertension and tachycardia have been recognized as commonly associated problems with intubation under lighter planes of anaesthesia[2].Cardiovascular response to intubation is of serious concern in patients with hypertension, raised ICP, diseased cerebral vasculature or with ischemic heart disease where an increase in myocardial oxygen consumption can lead to Myocardial Infarction[2]exact mechanism of hemodynamic response to laryngoscopy and intubation is not clear. The principal mechanism behind hypertension and tachycardia is an exaggerated sympathetic action[3,4] due to increased catecholamine release[5].

METHODS TO ATTENUATE HEMODYNAMIC RESPONSE TO INTUBATION:

Various pharmacological and non-pharmacological approaches have been used to attenuate the hemodynamic response to laryngoscopy and endotracheal intubation.

Non-pharmacological methods include:

1. Smooth & Gentle intubation with a shorter duration of laryngoscopy.

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2. Insertion of LMA instead of endotracheal intubation[6].
3. Blocking glossopharyngeal & superior laryngeal nerves.

Pharmacological methods include:

1. Inhalational anesthetics[7]
2. Intravenous lidocaine[8,9,10]
3. Narcotics[11,12,13]
4. Topical anaesthesia
5. Beta blockers[14,15,16]
6. Calcium channel blockers[17,18,19]
7. ACE inhibitors
8. Vasodilators like nitroglycerine [20] and sodium nitroprusside[20] etc.

Lignocaine is a readily available drug used for pressor response, and also has analgesic properties. Lignocaine given as bolus dose just before tracheal intubation[21] or extubation[22] has been effectively used to decrease hemodynamic responses associated with them.

Magnesium sulphate (MgSO4) inhibits catecholamine release from adrenals and reduces levels of serum epinephrine and cause a decrease in the atrial contraction, bradycardia, and vasodilatation[23]. Magnesium reduces the responsiveness of vascular smooth muscle to norepinephrine stimulation[24]. Hence, the primary objective of the present study is to compare the regimen of I.V Lignocaine versus I.V Magnesium Sulphate of pre-operative bolus doses in attenuation hemodynamic changes during tracheal intubation following elective surgeries.

MATERIALS AND METHODOLOGY

After taking approval from the institutional ethics committee, this study was conducted in a total of 60 patients over 2 years. All the patients were randomised and divided into two groups such that each group consists of 30 patients (n=30)

1. Group A received Lignocaine Hydrochloride 1.5 mg/kg body weight IV
2. Group B received Magnesium Sulphate 30 mg/kg body weight IV

INCLUSION CRITERIA

1. Patients with ASA physical status grade I and II.
2. Patients of age between 18-65 years.
3. Patients posted for elective surgeries under general anaesthesia requiring endotracheal intubation.

EXCLUSION CRITERIA

1. Patients with anticipated difficult intubation.
2. Patients with ASA physical status III and more.
3. Cardiogenic shock
4. Pregnant patients
5. Patients with a history of: a) Uncontrolled hypertension b) Asthma c) COPD d) Cardiac arrhythmias f) Overt heart failure. [25]

All the patients included in the study were admitted to hospital two days before surgery & were assessed as per the routine pre-anaesthetic check-up protocol. After taking informed written consent, all patients included were kept on over-night fasting.

After shifting the patient to the operating room, all the monitors were connected & baseline SBP, DBP, MAP, HR, SpO2 and ECG were recorded. Subsequently, an 18G intravenous access was secured, and intravenous fluids were started.

All the patients were premedicated with intravenous glycopyrrolate 0.004mg/kg body weight, midazolam 0.02mg/kg body weight & fentanyl 2 mcg/kg body weight were given. Anaesthesia was induced with intravenous Thiopentone sodium 5 mg/kg body weight given over 30 seconds; effects confirmed by loss of eyelash reflexes.

HR, SBP, DBP, MAP was recorded as readings just prior to administration of study drug. Then intravenous Vecuronium bromide 0.12mg/kg was given for muscle relaxation. The

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patients were then ventilated by a mask with 100% oxygen. After giving vecuronium, the study drug was administered:

1. Group A - Intravenous Lignocaine Hydrochloride 1.5 mg/kg as a bolus diluted to a total volume of 10ml with normal saline is administered 90 seconds after vecuronium and intubation done after 90 seconds.
2. Group B - Intravenous Magnesium Sulphate 30 mg/kg as a bolus diluted to a total volume of 10ml with normal saline is administered immediately after vecuronium and intubation attempted after 3 minutes.

Intubation was done with a cuffed endotracheal tube. After intubation, patients were maintained with N2O (66%) + O2 (33%) and controlled mechanical ventilation, non-depolarizing muscle relaxant vecuronium bromide 0.02mg/kg body weight was given intermittently.[26] The immediate time after endotracheal intubation was considered as '0' minute. Systolic blood pressure (SBP), diastolic blood pressure (DBP), mean arterial blood pressure (MAP) and heart rate (HR) were recorded at 0min, 3min, 5min & 10min time intervals after the endotracheal intubation. The surgical incision was allowed only after 10 min of endotracheal intubation.

The raise in blood pressure or heart rate by more than 20% of baseline value was considered as extreme raise. At the end of the surgical procedure, the residual neuromuscular blockade was antagonized with intravenous neostigmine 0.05mg/kg, and glycopyrrolate 10μ/kg and extubation was performed after fulfilling the extubation criteria.

Patients were observed for a few minutes in the operating room and then shifted to the post-anaesthesia care unit where they were monitored for the next 24 hours.

OBSERVATIONS & RESULTS

Below is the table showing the comparison of age, weight of patients of the 2 groups.

	MEAN ± SD		t value	p-value
	LIGNOCAINE	MgSO4		
AGE	33.77±12.54	31.67± 11.29	-0.682	0.4
WEIGHT	60.47 ± 9.3	65.77 ± 14.17	1.71	0.09

Inference:

Parameters are analysed using independent t-test, and there is no statistical significance. So, the 2 groups are comparable in terms of age and weight.

The following is the comparison of mallampati grades of the population of 2 groups being compared.

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MMP GRADES	LIGNOCAINE	MgSO4	t value	p value
1	14	15	0.74	0.86
2	12	13		
3	4	2		

Inference:
Analysed using chi-square test and there is no statistical significance. So, both the groups are comparable in terms of mallampati grades.

The following is the table of baseline parameters and their statistical analysis.

TIME	N	LIGNOCAINE		MGS04		t value	p-value
		MEAN	SD	MEAN	SD		
HR Baseline	60	93.20	15.83	89.27	11.64	-0.77	0.27
SBP Baseline	60	128.87	14.46	122.20	12.60	-1.903	0.06
DBP Baseline	60	79.90	9.34	78.20	7.53	-1.09	0.44
MAP Baseline	60	95.27	9.65	93.00	7.36	-1.02	0.31

INFERENCE
Analysed using the independent t-test. There is no statistical significance. So, both the groups are comparable in terms of HR, SBP, DBP and MAP at baseline.

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The following is the table of prior to study drug administration parameters and their statistical analysis.

TIME	N	LIGNOCAINE		MGS04		t value	p-value
		MEAN	SD	MEAN	SD		
HR Prior to Drug	60	84.63	13.75	84.83	9.99	0.064	0.94
SBP Prior to Drug	60	119.73	10.17	116.40	12.20	-1.14	0.25
DBP Prior to Drug	60	76.27	10.52	72.03	10.70	-1.54	0.12
MAP Prior to Drug	60	88.53	10.39	84.93	10.46	-1.34	0.18

Inference:
Analysed using the independent t-test, there is no statistical significance. So, both the groups are comparable in terms of HR, SBP, DBP and MAP prior to study drug administration.

The following is the table showing changes of HR, SBP, DBP and MAP from baseline in LIGNOCAINE group and their statistical analysis.

	BASELINE	0 MIN	3 MIN	5 MIN	10 MIN
MEAN HRSD	93.2	106.67	99.17	94.8	88.37
p-value	15.83	17.25	15.61	14.75	14.79
		0.002	0.14	0.68	0.22
MEAN SBPSD	128.87	149.3	131.97	124.7	115.7
p-value	14.47	21.38	15.42	13.15	13.3

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		0.0001	0.42	0.24	0.0005
MEAN DBPSD p-value	79.9	95.77	84.73	80.07	76.2
	9.35	17.64	14.59	12.05	12.03
		0.0001	0.13	0.95	0.18
MEAN MAPSD p-value	95.3	111.03	97.97	92.4	87.17
	9.66	19.08	14.78	12.63	12.74
		0.0002	0.41	0.32	0.007

Inference:
Changes of HR, SBP, DBP and MAP from baseline in lignocaine group were analyzed using the independent t-test. Raise in HR, SBP, DBP and MAP at 0 minutes post-intubation was significant in lignocaine groups. Then vitals took a decreasing trend and at 10 minutes post-intubation only SBP and MAP were decreased significantly from baseline in Lignocaine group.[27]

The following is the table showing changes of HR, SBP, DBP and MAP from baseline in MgSO4 group and their statistical analysis.

	BASELINE	0 MIN	3 MIN	5 MIN	10 MIN
MEAN HRSD p-value	89.27	98.53	91.63	86.37	81.57
	11.64	12.62	11.41	10.65	10.27
		0.004	0.42	0.31	0.008
MEAN SBPSD p-value	122.2	138.17	120.87	113.83	111.1
	12.6	19.22	14.76	11.87	12.44
		0.0003	0.7	0.01	0.0011
MEAN DBPSD p-value	78.2	94.43	77.53	74.23	69.7
	7.53	16.5	11.7	9.71	8.82
		0.0001	0.79	0.08	0.0002
MEAN MAPSD p-value	93	106.87	90.27	85.4	80.77
	7.37	15.82	11	9.3	8.62
		0.0001	0.26	0.0009	0.0001

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Inference:
Changes of HR, SBP, DBP and MAP from baseline in the MgSO4 group were analysed using independent t-test. Raise in HR, SBP, DBP and MAP at 0 minutes post-intubation was significant in this group also. Then vitals took a decreasing trend and at 5 minutes post-intubation SBP and MAP were decreased significantly in the Magnesium Sulphate group. At 10 minutes post-intubation, all the vitals (HR, SBP, DBP and MAP) decreased significantly from baseline in this group.

The following is the table and graph showing the comparison of HR at 0,3,5,10 minutes post-intubation between both groups and their statistical analysis.

TIME	N	LIGNOCAINE		MGS04		t value	p-value
		MEAN	SD	MEAN	SD		
HR @0 Min	60	106.67	17.25	98.53	12.62	-2.08	0.04
@ 3 Min	60	99.17	15.61	91.63	11.41	-2.13	0.03
@ 5 Min	60	94.80	14.75	86.37	10.65	0.067	0.01
@10 Min	60	88.37	14.79	81.57	10.27	-2.06	0.04

Inference:
HR at 0 minutes,3 minutes, 5 minutes and 10 minutes were compared between both the groups using the independent t-test. The p-value is < 0.05, which is statistically significant, implying that there is a significant difference between the groups. Mean of heart rates was more in lignocaine group compared to the magnesium sulphate group. So, with p-value being significant implies that
magnesium sulphate has attenuated the raise in heart rate better than lignocaine.
Considering the trend of HR, the mean of HR was decreased from baseline in both the groups prior to drug administration. It increased to the maximum immediately after intubation and then had a decreasing trend. Lignocaine group took 10 minutes for the HR to reach the baseline level, but the magnesium sulphate group took less than 5 minutes for the HR to reach the baseline level.

The following is the table and graph showing the comparison of SBP at
0,3,5,10 min post-intubation between both groups and their statistical analysis.

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TIME	N	LIGNOCAINE		MGS04		t value	p-value
		MEAN	SD	MEAN	SD		
SBP @0 Min	60	149.30	21.38	138.17	19.22	-2.12	0.03
@ 3 Min	60	131.97	15.42	120.87	14.76	-2.84	0.006
@ 5 Min	60	124.7	13.15	113.83	11.86	-3.36	0.001
@10 Min	60	115.70	13.30	111.10	12.44	-1.38	0.01

Inference:
SBP at 0 minutes,3 minutes, 5 minutes and 10 minutes were compared between both the groups using the independent t-test. The p-value is <0.05, which is significant, implying that there is a significant difference between the groups. Mean of SBP was more in lignocaine group compared to the magnesium sulphate group. So, with p-value being significant implies that magnesium sulphate has attenuated the raise in systolic blood pressure better than lignocaine.
Taking the trend of systolic blood pressure into account, the mean of SBP was decreased from baseline in both the groups prior to drug administration. It increased to the maximum immediately after intubation and then had a decreasing trend.
Lignocaine group took up to 5 minutes for the SBP to reach the baseline level, but the magnesium sulphate group took less than 3 minutes for the SBP to reach the baseline level.

The following is the table and graph showing the comparison of DBP at 0,3,5,10 min post-intubation between both groups and their statistical analysis.

TIME	N	LIGNOCAINE		MGS04		t value	p-value
		MEAN	SD	MEAN	SD		
DBP @0 Min	60	95.77	17.64	94.43	16.50	-0.30	0.76
@ 3 Min	60	84.73	14.59	77.53	11.70	-2.108	0.03
@ 5 Min	60	80.07	12.05	74.23	9.71	-2.06	0.04

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@10 Min	60	76.20	12.03	69.70	8.82	-2.38	0.02

Inference:
DBP at 0,3,5,10 minutes was compared between both the groups using the independent t-test. p-value at 0 minutes is 0.76, which is not significant, implying that there is no significant difference between the groups. p-value < 0.05 at 3, 5, 10 minutes post-intubation which is statistically significant. Mean of diastolic blood pressures was more in lignocaine group compared to the magnesium sulphate group. So, with p-value being significant implies that magnesium sulphate has
attenuated the raise in diastolic blood pressure better than lignocaine.
Taking the trend of diastolic blood pressure into account, the mean of DBP was decreased from baseline in both the groups prior to drug administration. It increased to the maximum immediately after intubation and then had a decreasing trend.
Lignocaine group took more than 5 minutes for the DBP to reach the baseline level,
but the magnesium sulphate group took less than 3 minutes for the DBP to reach the baseline level.

The following is the table and graph showing the comparison of MAP at 0,3,5,10 min post-intubation between both groups and their statistical analysis.

TIME	N	LIGNOCAINE		MGS04		t value	p-value
		MEAN	SD	MEAN	SD		
MAP @0 Min	60	111.03	19.07	106.87	15.82	-0.92	0.36
@ 3 Min	60	97.97	14.78	90.27	11.00	-2.28	0.02
@ 5 Min	60	92.40	12.63	85.40	9.30	-2.44	0.01
@10 Min	60	87.17	14.74	80.77	8.62	-2.27	0.02

Inference:
MAP at 0,3,5,10 minutes was compared between both the groups using the independent t-test. The p-value is 0.36, which is not significant, implying that there is no significant difference between the groups at 0 minutes post-intubation. p-value <0.05 at 3,5,10 minutes post-intubation implying that there is a statistically significant difference between the groups in terms of MAP. Mean of mean arterial pressures was more in lignocaine group compared to the magnesium sulphate group. So, with p-value being significant implies that magnesium sulphate has attenuated the raise in mean arterial pressure better than lignocaine.
Taking the trend of MAP into account, the mean of MAP was decreased from baseline in both the groups prior to drug administration. It increased to the maximum immediately after

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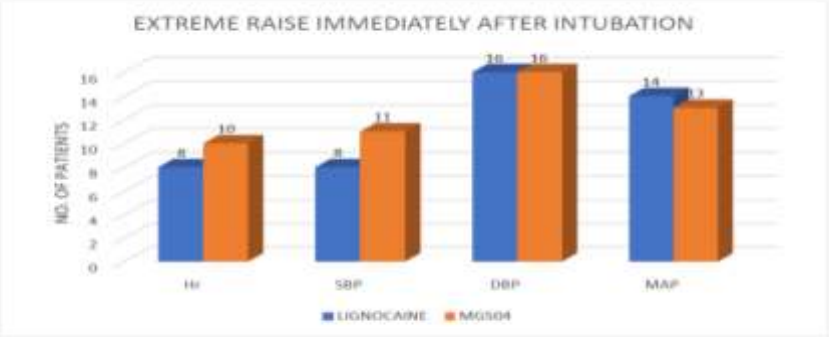
intubation and then had a decreasing trend. Lignocaine group took up to 5 minutes for the MAP to reach the baseline level, but the magnesium sulphate group took less than 3 minutes for the MAP to reach the baseline level.
The following is a graph comparing all the parameters in both groups for a 20% raise (extreme raise) from baseline.



Considering 20% of raise in vitals as significant increase, comparing lignocaine and magnesium sulphate groups, there are 8 patients in lignocaine group, but 10 patients in MgSO4 group whose HR has raised more than 20% of their baseline immediately after intubation, even when mean of HR was high in lignocaine group compared to magnesium sulphate group.
There are 8 patients in lignocaine group, but 11 patients in magnesium sulphate group whose SBP has raised more than 20% of their baseline immediately after intubation, even when mean of SBP was always lower in magnesium sulphate group compared to lignocaine group.
There are 16 patients each in both the groups whose DBP has raised more than 20% of their baseline immediately after intubation, even when mean of DBP was always lower in magnesium sulphate group compared to lignocaine group.
There are 14 patients in lignocaine group and 13 patients in MgSO4 group whose MAP has raised more than 20% of their baseline immediately after intubation, which is corresponding to lower mean of MAP in magnesium sulphate group compared to lignocaine group.

The following is the table showing the comparison and statistical analysis of parameters with a 20% raise from baseline between the 2 groups.

	LIGNOCAINE		MGS04		t value	p value
	Mean(n)	SD	Mean(n)	SD		
HR	117.37(8)	18.23	108.9(10)	9.13	1.28	0.21
SBP	161.88(8)	20.52	153.2(10)	20.48	0.92	0.36
DBP	106.56(16)	29.46	105(16)	11.59	0.41	0.67
MAP	125.07(14)	10.57	118.84(13)	11.95	1.41	0.17

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Inference:

It is analysed using independent t-test. p-value is > 0.05. So even if more number of patients had raise more than 20% from baseline in lignocaine group compared to the magnesium sulphate group, mean of these parameters is less in the magnesium sulphate group compared to lignocaine group. With p-value being > 0.05, it is statistically not significant.

DISCUSSION

The hemodynamic response to direct laryngoscopy and endotracheal intubation was first recognized in 1940 by Reid and Bruce et al[28]. Burstein et. Al[29], found that the pressor response to direct laryngoscopy and endotracheal intubation was due to augmented sympathetic response, provoked by stimulation of epipharynx and laryngopharynx.

Nikhil S Bhalerao[30] et al. studied the comparison of magnesium sulphate and lignocaine for attenuation of intubation response in 60 patients. All 60 patients were hypertensives in their study, whereas, in our study, ASA grade-1 patients also who do not have any co-morbidities were also included. They have conducted a double- blinded study, whereas blinding was not done in our study. 60 patients were randomised into 2 groups, with 30 patients in each group. Group 1 received MgSO4 50mg/kg diluted in 100ml 0.9%Normal Saline 30 minutes prior to induction of anaesthesia and group 2 received 100 ml 0.9% NS 30 minutes prior to induction of anesthesia and lignocaine 2mg/kg was given 90 seconds prior to intubation but, in our study, only 30mg/kg of magnesium sulphate was given 3 minutes prior to intubation and 1.5mg/kg of lignocaine 90 seconds prior to intubation. They used propofol for induction and succinylcholine for relaxation, whereas, in our study, thiopentone sodium was used for induction and vecuronium for relaxation. Propofol can decrease HR and BP in much higher grades than thiopentone.

Heart rate (HR) and blood pressure (BP) were recorded before, during, and after endotracheal intubation for 10 min. The difference in HR was not statistically significant between the groups throughout the study period, whereas, in our study, there was statistical significance between 2 groups. There was no significant increase in BP after laryngoscopy and intubation in any group of patients when compared with baseline whereas in our study there was significant raise in HR, BP in both the groups in immediate post-intubation time. In this study[30] MAP in MgSO4 group decreased after intubation and remained lower after tracheal intubation compared with baseline and lignocaine group, which is contrary to our study where MAP raised after intubation. Patients in lignocaine group showed a significant decrease in MAP as compared with baseline but there is a raise at 4 min after intubation which again decreased and continued until the end of study period which is contrary to our study which showed increase in mean HR and BP immediately after intubation which took a decreasing trend during further study period.

In this study[30] patients pretreated with magnesium sulphate (50 mg/kg) required interventions to manage hypotension but in our study no episodes of hypotension reported maybe because of the dose of magnesium sulphate used in our study was different from this study.This study[30] showed that Magnesium sulphate 50 mg/kg has better control of BP during intubation in hypertensive patients when compared with lignocaine 2 mg/kg, which is similar to the result of our study.

Dr G. R. Santhilatha, Dr.S. Seetaramaiah[31] et al. studied comparison of magnesium sulphate and lignocaine in 50 patients to evaluate the attenuation of pressor response during laryngoscopy and tracheal intubation under general anaesthesia. They have done a blinded study, whereas our study is not blinded. They randomly allocated patients into 2 groups. They have excluded hypertensives and diabetic patients from their study, whereas, in our

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study, patients with co- morbidities under control were included. Since hypertensives and diabetic patients with autonomic neuropathy may have wide variations in their vitals with induction andother anaesthetic drugs, this may alter their study results from our study.

Patients were premedicated with fentanyl 1mcg/kg in their study, but in our study, patients were premedicated with 2mcg/kg fentanyl. Group 1 received IV MgSO4 (20mg/kg) and Group 2 received IV 2% Lignocaine (1.5mg/kg) before induction whereas, in our study, drugs (MgSO4 30mg/kg) were given after induction of anaesthesia(3 minutes before intubation). In their study, they used Thiopentone 5mg/kg for induction which is similar to our study. Patients were relaxed with succinylcholine in their study, but Vecuronium is used for relaxation in our study.

They recorded PR, SBP, DBP, MAP 5 minutes before induction, 1min beforelaryngoscopy & intubation & 1,2,3,4,5,10,15 minutes after intubation.

HR increased in both the groups post-intubation but did not raise significantly in the magnesium sulphate group, but in our study, it raised significantly in both the groups. In this study, the increase in HR was significant in the lignocaine group when compared to MgSO4 group throughout the study period, which is similar to our study.SBP and MAP increased 1 and 3 min after tracheal intubation in both the groups but the increase is significant in lignocaine group compared to magnesium sulphate at both 1 min and 3 minutes. In our study, both SBP and MAP increased but raise in SBP was significant in lignocaine group at 0 and 3 minutes but MAP raise at 0 minutes was not statistically significant between the 2 groups.

Changes in the HR returned to near baseline within 3-5 mins in the MgSO4 group, which is similar to our study. Changes in SBP, DBP returned to normal in 3-5 min in the MgSO4 group in this study[59], but in our study, it reached baseline in less than 3 minutes maybe because of the increased amount of drug dose used in our study compared to this study. Changes in the HR, SBP & DBP returned to near baseline within 10 mins in lignocaine group in their study, which is similar to our study. There are no side effects in this study patients among magnesium sulphate group may be because of low dose compared to the study done by Bhale Rao Et al.

This study[31] showed that i.v. MgSO4 20mg/kg significantly attenuated the pressor response to laryngoscopy & intubation in comparison with i.v. lidocaine1.5mg/kg, which is similar to our study.

Sachin Padmawar, Manish Patil[32] et al. studied the comparison of Lignocaine vs Magnesium Sulphate for Attenuation of Stress Responses to Laryngoscopy and Endotracheal Intubation using 100 patients which is a study group much bigger than our study group. Patients were randomly allocated in two equal groups and study drugs i.e; lignocaine (1.5 mg/kg) or magnesium sulphate (40mg/kg) were administered before induction whereas, in our study, MgSO4 30mg/kg was administered 3 minutes prior to intubation and lignocaine 1.5mg/kg 90 seconds prior to intubation assuming that the peak action of drug for that dose occurs at the time of intubation. Anaesthesia was induced with i.v thiopentone sodium 5 mg/kg similar to our study, relaxed with i.v succinylcholine 1.5 mg/ kg whereas, in our study, vecuronium was used. The parameters like HR, SBP, DBP, MAP and rate pressure product at various time

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intervals up to 5 minutes post- intubation were recorded whereas, RPP was not calculated in our study. Efficacy ofboth drugs to reduce haemodynamic responses was compared with the Z test, whereas, independent t-test was used in our study.

In their study in both groups, there was a significant raise in HR, SBP, DBP, MAP and RPP at 1 minute post-intubation similar to what is observed in our study. RPP also raised after intubation, and it crossed the angina limit of 12000 in more than 50% of patients. In their study, none of the parameters attained baseline level for 5 minutes in lignocaine group, but in our study, though HR did not reach the baseline value in 5 minutes, SBP, DBP and MAP reached the baseline level in almost 5 minutes. In MgSO4 group there was increase in HR, SBP, DBP, MAP and RPP (but did not cross the angina limit) after intubation at 1 minute similar to our study, but they took 5 minutes to attain baseline level whereas in our study, though HR reached baseline level at 5 minutes similar to this study[32], SBP, DBP and MAP reached baseline values in less than 3 minutes which is much earlier than this study.

This study[32] concluded that magnesium sulphate is better than lignocaine forattenuation of stress responses of laryngoscopy and intubation, which is in agreement with our study.

Navid Nooraei, Masih Ebrahimi Dehkordi[33] et al. studied the effects of intravenous Magnesium Sulphate and Lidocaine on Hemodynamic Variables
following Direct Laryngoscopy and Intubation in Elective Surgery Patients. Subjects with diabetes, blood pressure history who are prone to wide variations in the hemodynamics were not included in this study, whereas those patients were included in our study. They allocated the patients randomly into 2 groups. 1 group received 60 mg/kg i.v magnesium sulphate and the other group received i.v lidocaine1.5mg/kg 3 minutes prior to intubation.

Values of SBP, DBP, MAP and HR were recorded for both groups during the 5 minutes following administration and compared with baseline values.

In the lidocaine group, mean SBP, DBP increased after intubation compared with baseline blood pressure and then gradually decreased. This increase comparedto the baseline value in the first 3 minutes was statistically significant after which it was not significant, whereas, in our study, it is only significant for the immediatepost-intubation time. For 3 minutes post-intubation, the raise in SBP was notstatistically significant. Heart rate after intubation showed an increase, and incomparison to the baseline value in the first two minutes, this increase was significant after which it was not significant, whereas in our study the raise issignificant for the immediate post-intubation reading(0 min) only.

In the magnesium sulphate group, mean systolic pressure after intubation showed an increase compared with the baseline and then gradually decreased. However, the increase was only significant in the first minute, which is in agreementwith our study. Diastolic blood pressure in the magnesium sulphate group also showed an increase after intubation, but the increase is not significant at 5 minutes after intubation whereas in our study it is not significant even at 3 minutes post- intubation. The heart rate after intubation increased, but this increase remained statistically significant for 4 minutes, whereas in our study, there is no significant difference at 3 minutes post-intubation also. Although after intubation, mean arterial pressure in the magnesium sulphate group increased, this increase was only significant during the first two minutes, which is in agreement with our study.

When these 2 groups were compared, a significant difference was present in SBP between groups only in the first 2 minutes post-intubation with magnesium sulphate group being better than lignocaine in attenuating intubation response. The difference in MAP was not statistically significant in this study which is contrary to our study. The difference in HR between groups when compared showed that lignocainehas statistically lower heart rates at 2,3,4 minutes compared to MgSO4 group, which is contrary to our study.

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This study[33] concluded that Magnesium sulphate is more effective than lidocaine in controlling hemodynamics, although it may increase the heart rate.

Recently, anaesthesia research has begun to compare the efficacies of several drugs against each other, rather than relying on studies that isolate a single drug's effect vs placebo intervention. The present study compared the efficacy of i.v Lignocaine and i.v Magnesium sulphate in determining which is best in preventing tachycardia and hypertension secondary to endotracheal intubation. The result obtained from this study found that both I.V lignocaine and i.v Magnesium Sulphate are effective in controlling SBP, DBP, HR, & MAP. Magnesium Sulphate is more effective than lignocaine in attenuating HR, SBP, DBP and MAP. Magnesium Sulphate, at an intravenous dose of 30 mg/kg "provided consistent and reliable protection against increases in both HR and BP accompanying laryngoscopy and Intubation. The observations are also in close agreement with other studies who used this drug to achieve attenuation of pressor response to direct laryngoscopy and endotracheal intubation.

PITFALLS OF OUR STUDY:

The study population was belonging to one demographic area only.
All the intubations were not done by a single anesthesiologist, which might alter the results.
Neuromuscular monitoring was not done in our study.
Depth of anaesthesia monitoring was not done in our study.
Intraoperative hemodynamic stability and extubation responses were not monitored in our study, as the observations are limited to 10 minutes postintubation.

CONCLUSIONS:

Raise in HR, SBP, DBP and MAP at 0 minutes post-intubation (immediatelyafter intubation) were significant in both the groups.
The attenuation of the increase in HR and SBP was significantly better with magnesium sulphate compared to lignocaine from 0 minutes post-intubation.
At 5 minutes post-intubation SBP and MAP decreased significantly in Magnesium Sulphate group, but in Lignocaine group vitals did not decrease significantly though they had taken a decreasing trend.
At 10 minutes post-intubation only SBP and MAP were decreased significantlyfrom baseline in Lignocaine group, but in Magnesium sulphate group all the vitals remained decreased.
Though immediate attenuation of DBP and MAP was not much different inboth groups, but the subsequent decrease (at 3, 5 and 10 minutes) was significant with magnesium sulphate compared to lignocaine.

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