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The Profile Effect of the Use of MgSo4 to Attenuate Hemodynamic Response to Tracheal Intubation

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Original Article

Summary

***Background**: Endotracheal intubation is routinely practiced in general anesthesia, with potential hemodynamic effects on patients. Several techniques and adjuvants have been tried to improve intubating condition, like potent volatile agents, opioids, lidocaine, B-blockers and MgSO4 or combination of more than one technique.*

***Objective**: To assess the profile effect of the use of MgSo4 to attenuate hemodynamic response to tracheal intubation.*

***Patient and methods:** A prospective randomized double blind clinical trial study of 40 patients undergone elective lower abdominal and perianal surgeries, 20 of them received Mg sulfate 30 mg / kg before the induction, the other 20 received normal saline, vital signs (pulse rate and rhythm, systolic and diastolic blood pressure) were recorded after mg sulfate, pre induction, pre intubation, directly after intubation and 3 min. after intubation.*

***Results:** It was found there were significant differences between both groups in vital signs after mgSO4 administration, were p – value below 0.05. Group A (magnesium sulfate) shows significant prolongation in a time from reversal of muscle relaxant and Extubation were the p – value below 0.05. There were no significant differences between (magnesium sulfate) and (control group) in the duration of operation, intubation score, and incidence of dysrhythmia. VIII. In addition, there was no significant differences in Vital Signs at preoperative reading and after 3 min. after intubation were the p – value above 0.05.*

***Conclusion:** The use of I.V. magnesium sulfate is an effective technique in reducing the hemodynamic response to laryngoscopy and tracheal intubation with prolongation in the time of recovery.*

***Keywords:** Tracheal intubation, MgSO4, Cormack score.*

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1. INTRODUCTION

Magnesium sulfate

Magnesium is the fourth most important cation in the body and the second most important intracellular cation. Magnesium activates approximately 300 enzyme systems(1), including most of the enzymes involved in energy metabolism. The range of and types of enzymes activated by magnesium and the mechanisms by which the metal is involved have been outlined by Durlach(2). Magnesium is also essential for the production and functioning of adenosine triphosphate (ATP), which is fully functional only when chelated to magnesium. The means by which magnesium and magnesium adenosine triphosphate chelates regulate the most important glycolytic enzymes-hexokinase, phosphofructokinase, aldolase, phosphoglycerate kinase, and pyruvate kinas-are described in detail by Garfinkel and Garfinkel(3). Oxidative phosphorylation is magnesium-dependent, and Aikawa(4) has suggested that magnesium may also regulate this process. Other processes dependent on magnesium include the production of DNA and RNA and protein synthesis(5). The ion is an essential regulator of calcium access into the cell and of the actions of calcium within the cell. Magnesium regulates intracellular calcium levels by activating membrane pumps in the cell that extrude calcium from the cytosol(6) and by competing with calcium for transmembrane channels by which extracellular calcium gains access to the interior of the cell(7). In addition, magnesium competes with calcium for binding sites on protein kinases(8) and influences the calcium-mediated release of transmitter substances(9). Thus, magnesium plays an essential role in the regulation of most cellular functions and may be regarded as the natural physiologic calcium antagonist(10).

Uses

Indications for internal use are:

• Replacement therapy for hypomagnesaemia.(11)

• Magnesium sulfate is the first-line antiarrhythmic agent for torsades de pointes in cardiac arrest under the 2005 ECC guidelines and for managing quinidine-induced arrhythmias.(12).

• As a bronchodilator after beta-agonist and anticholinergic agents have been tried, e.g. in severe exacerbations of asthma.(13) Studies conducted have revealed that magnesium sulfate can be nebulized to reduce the symptoms of acute asthma.(13) It is commonly administered via the intravenous route for the management of severe asthma attacks.

• Magnesium sulfate can be used to treat eclampsia in pregnant women (14).

• Intravenous magnesium sulfate has been shown to prevent cerebral palsy in preterm babies(15). A recent systematic review suggests that antenatal intravenous magnesium sulphate can reduce the risk of cerebral palsy and gross motor dysfunction in preterm infants by on average 30%(16).

• Magnesium sulfate has been used as an experimental treatment of Irukandji syndrome caused by envenomation by certain species of Irukandji jellyfish, however the efficacy of this treatment remains unproven (17).

• Solutions of sulfate salts such as Epsom salt may be given as first aid for barium chloride poisoning(18).

An overdose of magnesium causes hypermagnesaemia.

Clinical Usage in Anesthesia

Although magnesium interacts with neuromuscular blocking drugs, prime attention should be placed on its cardiovascular effects with the actions of both a calcium antagonist with vasodilator and antiarrhythmic effects and an adrenergic antagonist with principally α-antagonistic actions, Because of these dual actions, magnesium has a number of potential indications in anesthesia.

Obstetric Use

Magnesium is primarily used in obstetrics for prophylaxis and treatment of convulsions in the management of patients with gestational protein uric hypertension. Magnesium inhibits the release of acetylcholine from the motor nerve terminal and to a lesser extent, decreases the sensitivity of the post-junctional membrane and reduces the excitability of the muscle fiber(19). The consequent enhancement of non-depolarizing neuromuscular blockers is of importance, and reduced dosages of these agents are recommended when MgSO4 has been used, together with careful monitoring of neuromuscular transmission. Even the relatively short-acting relaxant vecuronium has been associated with significantly prolonged paralysis in the presence of high serum magnesium concentrations(20).

Rapid rates of stimulation reverse a partial magnesium blockade, as opposed to the increasing blockade seen with d-tubocurarine. Perhaps d-tubocurarine inhibits the mobilization of acetylcholine, whereas magnesium does not (21). There is no good explanation as to why magnesium should enhance the effect of succinylcholine. Prolonged action of succinylcholine may be seen in the pre-eclamptic patient, but this is more likely to

be due to the reduction in cholinesterase that accompanies the condition rather than to the use of magnesium (22). It must be emphasized that the presence of significant hypermagnesemia in the pregnant patient makes the use of defasciculating doses of non-depolarizing relaxants before induction of anesthesia not only unnecessary but potentially hazardous. Of more interest to the obstetric anesthetist is the ability of magnesium to alter the cardiovascular response to endotracheal intubation in patients with gestational protein uric hypertension. It found that MgSO4 (40 mg/kg) was superior to either lidocaine (1.5 mg/kg) or alfentanil (10 mcg/kg) for the control of the hypertensive response to tracheal intubation in terms of the numbers of hypertensive episodes found. In addition, MgSO4, and lidocaine both produced less fetal depression than did alfentanil. Alfentanil, however, produced better control of heart rate(23). A combination of 30 mg/kg of MgSO4, with 7.5 mcq/kg of alfentanil is superior to the larger dose of either agent alone, with no increase in side effects(24). For the very severe pre-eclamptic patient, a combination of MgSO4, and alfentanil may be superior to magnesium alone. In gravid ewes, magnesium reduces reflex sympathetic vasoconstriction in response to hypotension(25) and the hypertensive response to many vasoconstrictors(26).

Although these actions may be beneficial in controlling presser responses to events such as endotracheal intubation or straining during labor, they may also worsen hypotension in the presence of hemorrhage. In both studies, however, cardiac output was sustained, which is in line with earlier work(27). Magnesium will increase the likelihood of modest hypotension during epidural anesthesia in normotensive ewes, but this change is unlikely to be associated with increased risk to the fetus(28). Whether or not magnesium will increase the likelihood or severity of hypotension in patients with gestational protein uric hypertension receiving epidural analgesia has not yet been studied. However, present evidence would tend to indicate that the sustained cardiac output and uterine blood flow will minimize the risks of hypotension to both mother and fetus.

Pheochromocytoma

The ability of magnesium to inhibit the release of catecholamines and to act as an antiadrenergic has recently been advanced as a rationale for the use of MgSO4 infusions in the anesthetic management of patients undergoing resection of a pheochromocytoma(29). It would be expected that magnesium would be particularly effective during maneuvers that release catecholamines indirectly, such as induction of anesthesia, intubation of the trachea,

and surgical stimulation, and this does, indeed, appear to be the case. Magnesium would likely be less effective during tumor handling when it would be less able to influence the release of catecholamine from the tumor. However, its peripheral antiadrenergic actions are still of substantial benefit. In addition to the reported series of 17 anesthetics(29), an additional 11 patients have been studied. In this series of 28 cases, MgSO4, has been completely successful as a sole agent throughout 23 of the anesthetics even during periods of extensive tumor handling.

Side effects of magnesium sulfate and overdose:

1. Cardiac conduction defects, drowsiness, reduced tendon reflexes, muscle weakness, hypoventilation and cardiac arrest may occur with increasing hypermagnesaemia.
2. Augments non-depolarizing and depolarizing neuro-muscular blockade. Neonatal hypotonia may also occur.
3. Over dosage: may be treated with I.V. calcium.
4. Therapeutic plasma levels: 2.0–3.5 mmol/l; side effects may occur above 4–5 mmol/l, with cardiac arrest above 12 mmol/l. Loss of deep tendon reflexes (e.g. knee jerk) may indicate impending toxicity(30).

Endotracheal Intubation

Tracheal intubation, usually simply referred to as intubation, is the placement of a flexible plastic tube into the trachea to maintain an open airway or to serve as a conduit through which to administer certain drugs. It is frequently performed in critically injured ill or anesthetized patients to facilitate ventilation of the lungs, including mechanical ventilation, and to prevent the possibility of asphyxiation or airway obstruction.

The most widely used route is orotracheal, in which an endotracheal tube is passed through the mouth and vocal apparatus into the trachea. In a nasotracheal procedure, an endotracheal tube is passed through the nose and vocal apparatus into the trachea. Other methods of intubation involve surgery and include the cricothyrotomy (used almost exclusively in emergency circumstances) and the tracheotomy, used primarily in situations where a prolonged need for airway support is anticipated.

Because it is an invasive and extremely uncomfortable medical procedure, intubation is usually performed after administration of general anesthesia and a neuromuscular-blocking drug. It can however be performed in the awake patient with local or topical anesthesia, or in an emergency without any anesthesia at all. Intubation is normally facilitated by using a

conventional laryngoscope, flexible fiberoptic bronchoscope or video laryngoscope to identify the glottis, though other devices and techniques are available.

After the trachea has been intubated, a balloon cuff is typically inflated just above the far end of the tube to help secure it in place, to prevent leakage of respiratory gases, and to protect the tracheobronchial tree from receiving undesirable material such as stomach acid. The tube is then secured to the face or neck and connected to a T-piece, anesthesia breathing circuit, bag valve mask device, or a mechanical ventilator.

Once there is no longer a need for ventilatory assistance and/or protection of the airway, the tracheal tube is removed this is referred to as extubation of the trachea.

No single method for confirming tracheal tube placement has been shown to be 100% reliable. Accordingly, the use of multiple methods for confirmation of correct tube placement is now widely considered to be the standard of care.(31) Such methods include direct visualization as the tip of the tube passes through the glottis, or indirect visualization of the tracheal tube within the trachea using a device such as a bronchoscope. With a properly positioned tracheal tube, equal bilateral breath sounds will be heard upon listening to the chest with a stethoscope, and no sound upon listening to the area over the stomach. Equal bilateral rise and fall of the chest wall will be evident with ventilatory excursions. A small amount of water vapor will also be evident within the lumen of the tube with each exhalation and there will be no gastric contents in the tracheal tube at any time.(32)

Ideally, at least one of the methods utilized for confirming tracheal tube placement will be a measuring instrument.

Waveform capnography has emerged as the gold standard for the confirmation of tube placement within the trachea. Other methods relying on instruments include the use of a colorimetric end-tidal carbon dioxide detector, a self-inflating esophageal bulb, or an esophageal detection device.(33) The distal tip of a properly positioned tracheal tube will be located in the mid-trachea, roughly 2 cm (1 in.) above the bifurcation of the carina; this can be confirmed by chest x-ray. If it is inserted too far into the trachea (beyond the carina), the tip of the tracheal tube is likely to be within the right main bronchus a situation often referred to as a "right main stem intubation". In this situation, the left lung may be unable to participate in ventilation, which can lead to decreased oxygen content due to ventilation/perfusion mismatch.(34)

Risk

Risks for any surgery are:

• Bleeding

• Infection

Additional risks for this procedure include trauma to the voice box (larynx), thyroid gland, vocal cords and trachea (windpipe), or esophagus. Puncture or perforation (tearing) of body parts in the chest cavity, leading to lung collapse, may also occur(35).

Benefits of an endotracheal airway include:

• Protection against aspiration and gastric insufflation

• More effective ventilation and oxygenation

• Facilitation of suctioning

• Delivery of anesthetic and other drugs via the endotracheal tube (ETT).

Previously restricted to the anesthetic and operating rooms, advances such as rapid sequence induction (RSI) have meant that intubation is often performed in emergency or pre-hospital settings.(36) These situations are by their nature high-risk and there is some evidence that pre-hospital endotracheal intubation in adult major trauma patients with head injury actually increases mortality.(37)(38) Similarly, there is evidence that the use of advanced airway management in the setting of an out-of-hospital cardiac arrest is associated with adverse outcomes(39). Many confounding variables exist - experience levels, lack of monitoring equipment, difficulties pre-oxygenating patients, etc. and the studies are retrospective; however, benefit should not be assumed.

Intubation is a technique that requires training, experience and regular updating to maintain competence. Anyone attempting it should also be capable of managing any complications that arise. GPs will vary in their ability: some will have developed a special interest during hospital training, gained postgraduate qualifications and may even perform regular anesthetic lists; others will have an interest in pre-hospital and emergency care and may be involved in BASICS or ATLS to maintain relevant skills. The key principle is not to act beyond your personal level of competence.

Indications (40)

The patient is unable to protect their airway:

• Loss of reflexes e.g. obtunded or GCS less than 8.

• Relaxation of muscles e.g. hyperthermia.

• Risk of aspiration from the stomach, blood or secretions.

• Loss of airway patency or potential for obstruction e.g. burns, epiglottitis.

Prophylactically:

• High risk of losing airway protection or patency e.g. local neck haematoma or airway burns.

• To control the airway e.g. pre-transfer, clinical deterioration expected, uncooperative patient needing urgent investigations or treatment.

Inadequate ventilation:

• Treatment of hypercapnia e.g. severe COPD, head injury.

• Selective lung ventilation e.g. massive haemoptysis, bronchopulmonary fistula.

Inability to oxygenate the patient:

• e.g. severe ARDS or severe CO toxicity.

• Drug delivery: a rare indication e.g. surfactant in a neonate.

Contra-indications(40)

Relative contra-indications:

• Neck immobility or increased risk of neck trauma (e.g. rheumatoid arthritis or suspected cervical spine injury) - this is not a true contra-indication, it just makes intubation more difficult. Consider fibreoptic intubation if available.

• Anticipated "difficult" airway - unsuccessful intubation may lead to further difficulties, especially if anesthetic drugs have been given. In this scenario it is best to continue bag and mask ventilation (if possible) and get immediate senior help, or use of other airway adjuncts or consider awake intubation.

Absolute contra-indications: (will necessitate a surgical airway or nasal intubation):

• Total upper airway obstruction.

• Total loss of facial/oropharyngeal landmarks.

• Inability to open the mouth (e.g. scleroderma or surgical wiring).

Intubation

Intubation attempts should not last for longer than 30 seconds.

• Begin by keeping your right hand free - it will be needed to open the mouth, control the head and to use suction etc. Inspect the mouth for loose teeth or for dentures and remove. Suction any secretions or vomitus. Once a satisfactory view of the airway is available the endotracheal tube should be handled.

• Hold the laryngoscope in the left hand and the ETT in the right and introduce the laryngoscope over the right side of the tongue, sweeping the tongue to the mid-line. If using a Miller straight blade on the laryngoscope then the tip does not go into the vallecula (between the epiglottis and the base of the tongue).

• Position the tip of the blade in the vallecula and lift upwards and away from yourself until the glottis is visualised.

• Exert traction along the axis of the handle - do not use the teeth or gums as a fulcrum, as this will result in damage to teeth and/or gums.

• Introduce the ETT into the right corner of the mouth, passing it through the vocal cords with the cuff positioned and inflated just beyond the cords.

• Ventilate with high concentration oxygen and secure the ETT.

• The following will help assess tube position:

• Directly observing the endotracheal tube pass through the vocal cords.

• Fogging of the tube on ventilation.

• Look for symmetrical chest movement.

• Listen over apices and base of lungs and stomach for equal breath sounds and no gastric breath sounds.

• End-tidal carbon dioxide monitor attached to ETT.

• Following successful intubation ongoing sedation, with or without muscle relaxation is required.

Intubation score

Widely accepted classification (of Cormack and Lehane) according to the best view possible at direct laryngoscopy (figure 1a): grade 1: complete glottis visible. grade 2: anterior glottis not seen. grade 3: epiglottis seen but not glottis. grade 4: epiglottis not seen. poor view of the pharyngeal structures with open mouth and tongue protruded maximally, with the observer level with the seated patient. The modified Mallampati classification is commonly used (figure 1b): soft palate, uvula, fauces and pillars visible (class 1); soft palate, fauces and uvula visible (class 2); only soft palate visible (class 3); and soft palate not visible (class 4). A ‘class 0’ has been suggested in which the tip of the epiglottis itself is visible. The test is also valid if performed with the patient supine but there may be significant inter observer differences in any position. Phonation during testing misleadingly improves the rating(41).

Sympathetic overdrive during intubation

Laryngoscopy and endotracheal intubation is an integral part of general anesthesia. for Direct laryngoscopy and passage of endotracheal tube through the larynx is a noxious stimulus, which can provoke untoward response in the cardiovascular, respiratory and other physiological systems.[42] Significant tachycardia and hypertension can occur with tracheal intubation under light anesthesia. The magnitude of cardiovascular response is directly related to the force and duration of laryngoscopy.[43] The sympathetic response and the resulting hemodynamic response have been extensively studied and documented in different patient groups, both with and without cardiac illness.[44] Hypertension, tachycardia and arrhythmia caused by endotracheal intubation can be deleterious in patients with poor cardiovascular reserve. Such hemodynamic changes that occur during intubation may alter the delicate balance between myocardial oxygen demand and supply and precipitate myocardial ischemia in patients with coronary artery disease. Methods to attenuate these responses, both pharmacological and otherwise, have also been studied.[45–47]

Attenuation of sympathetic overdrive during intubation (48).

One of several techniques may be used before intubation to attenuate the hypertensive response:

• Deepening anesthesia with a potent volatile agent.

• Administering a bolus of an opioid (fentanyl, 2.5–5 mcg/kg; alfentanil, 15–25 mcg/kg; sufentanil, 0.5–1.0 mcg/kg; or remifentanil 0.5–1 mcg/kg).

• Administering lidocaine, 1.5 mg/kg intravenously, intratracheally, or topically in the airway.

• Achieving β-adrenergic blockade with esmolol, 0.3–1.5 mg/kg; metoprolol 1–5 mg; or labetalol, 5–20 mg.

• Nitroglycerine infusion or patch.

• MgSO4 30mg/kg:

The objective for use Mgso4 :

The use of Mgso4 for attenuate the sympathetic over drive during intubation and to decrease the stress response of instrumentation and manipulation in anesthetized patient.

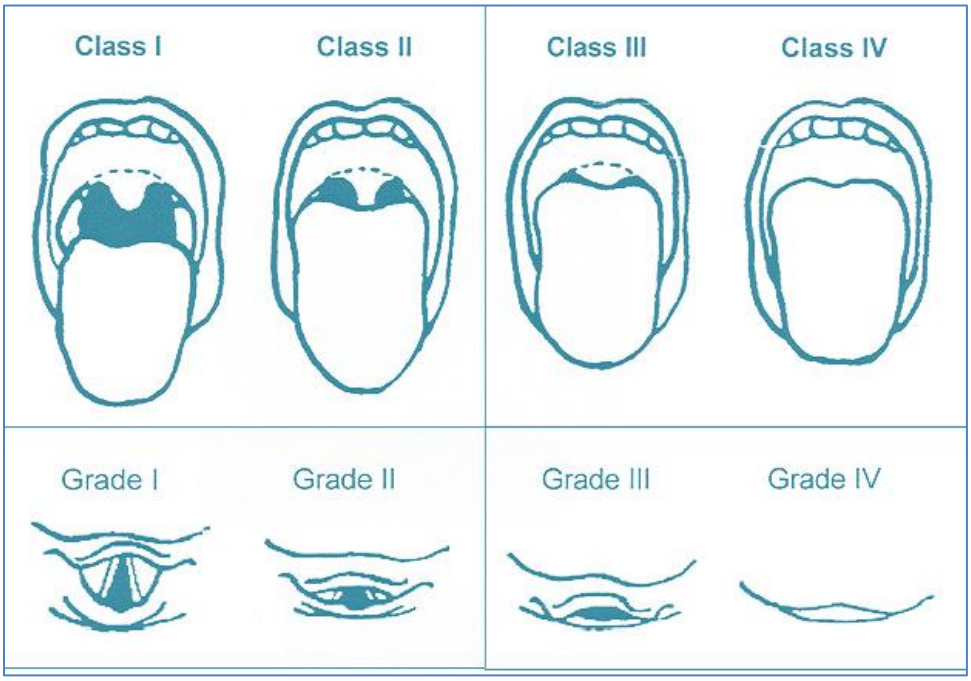

Figure . (Intubation score):

a: The modified Mallampati classification

b: classification of Cormack and Lehane

2. PATIENTS and METHODS

A prospective Randomized double blinded study was carried out in General Surgery theatres of Baghdad Teaching Hospital, during the period from the first of March 2013 to the30thDecember 2013.

40 patients were included, who were operated on for elective intermediate lower abdominal operations and perennial surgery.

Inclusion criteria:

The patients were included in the study if they met the following.

• ASA I and II

• Age : from 18years to 62 years

Exclusion Criteria:

• Known history or Anticipated difficult intubation

• Patient refused.

• Patient on β blockers.

• Pregnant lady.

• Hx of any known drug allergy used in study.

An informed consent was obtained from all patients before enrolling them in the Study, and the study was approved by the local committee of the scientific council of anesthesia and intensive care.

Data were collected using a pre-constructed form Data collecting sheet (1) and a detailed history was taken from each patient; information about the age of the patient and past medical history. A clinical examination was performed by general examination and vital signs measurement.

Anaesthetic management was standardized as follows:

All patients received:

• Premedication: 50mg ranitidine, 10 mg metoclopramide, 8mg dexamethasone and 0.02mg/kg midazolam as pre-induction agent.

• MgSO4: After giving premedication, Patients then randomly divided into two groups:

Group A: received Magnesium Sulfate 30mg/Kg diluted into 20 ml by normal saline over 3 minutes.

Group B: received Normal Saline 20 ml over 3 minutes as control group.

• Induction: Anesthesia was induced with a anesthetizing dose of propofol (1.5 – 2.5 mg/kg), fentanyl 1miq/kg, and tracheal intubation (with size 7.0-8.0 ID endotracheal tube) was facilitated with 0.5 mg/Kg of Atracurium. Anesthesia was maintained with halothane 0.6-1.0% in 100% oxygen. Neuromuscular blockade was maintained with incremental doses of 0.1mg/kg atracurium.

Data were collected (Pulse rate, Systolic and Diastolic Blood pressure) before test drug (basal reading) and after magnesium sulfate, pre induction, pre intubation, after intubation and 3 minutes after intubation.

All data were collected between test group and control group in (Duration of surgery, Intubation score, Dysrhythmia, Time from Reversal of muscle relaxant and extubation).

All patient monitored during operation by using pulse oximetry, non-invasive blood pressure monitoring, 3-leads ECG.

Statistical analysis:

Data were analyzed using SPSS (statistical package for social sciences) version 20/IBM. Descriptive statistics were expressed as mean ±SD (standard deviation).

Student’s paired t - test was used for comparison among vital signs, pain score and the need

for analgesia within groups, Student's independent t- test was used to compare variables in between both groups.

All data were presented in tables, figures or paragraphs and in all statistical analysis and procedures level of significance was set at p-value (sig.) 0.05 to be considered as significant difference

3. RESULTS

By applying the SPSS V20.0/IBM using the independent sample t-student test and chi-square and using the epi- calculator it's found that there were significant difference between both group in PR, Systolic and diastolic BP after MgSO4 administration, after induction and directly after intubation were P.value < 0.05.

There were significant difference in the time from Reversal of muscle relaxant and extubation were P. value < 0.05. No significant difference between group A (Magnesium sulfate group) and Group B (Control group) in the Age, weight, duration of operation, intubation score (number of attempt, Cormack score, Vocal cord mobility and position), Pulse rate, systolic and diastolic blood pressure at preoperative reading and after 3 min after intubation, in all comparisons, P.value > 0.05. None of the patients in both groups developed dysrhythmia so P.value was not applicable. All these findings are shown in the subsequent tables below:

Table 1. Age and weight distribution of the studied groups

Variable	Group A (n=20)		Group B (n=20)		P. value
	Mean	SD	Mean	SD	
Age (year)	44.9	6.4	41.5	8.3	0.723 ns
Weight (kg)	79.5	9.1	77.9	12.7	0.676 ns

SD: standard deviation of mean, ns: not significant

Table 2. Comparison of Systolic Blood Pressure of the studied groups

	Group A		Group B		P. value
	Mean	SD	Mean	SD	
Baseline	128.6	11.7	132.5	13.4	0.931 ns
After MgSO4	126.5	14.4	134.6	24.5	0.39 ns
After induction	124.7	12.9	133.5	24.6	0.25 ns
After intubation	125.8	13.5	139.5	23.9	0.032 sig
Three minutes after	130.4	12.9	135.8	12.4	0.081 ns

SD: standard deviation of mean, ns: not significant

Table 3. Comparison of Diastolic Blood Pressure of the studied groups

	Group A		Group B		P. value
	Mean	SD	Mean	SD	
Baseline	88.7	9.4	86.8	10.9	0.931
After MgSO4	72.8	12.8	85.1	9.6	0.019
After induction	69.1	9.0	78.9	13.9	0.027
After intubation	72.5	10.1	80.0	13.4	0.002
Three minutes after	74.9	11.0	76.3	9.0	0.431

SD: standard deviation of mean, ns: not significant, sig: significant

Table 4. Comparison of Pulse rate of the studied groups

	Group A		Group B		P. value
	Mean	SD	Mean	SD	
Baseline	84.7	22.7	83.6	19.9	0.091
After MgSO4	71.7	12.7	82.7	17.5	0.007
After induction	70.9	18.5	77.3	17.3	0.009
After intubation	73.0	10.4	85.8	18.5	0.001
Three minutes after	79.5	10.1	82.4	15.4	0.056

SD: standard deviation of mean, ns: not significant, sig: significant

Table 5. Frequency distribution of number of attempt for intubation and Cormack Grade of the studied groups

		Group A		Group B		P. value
		No.	%	No.	%	
Attempt for intubation	1st attempt	20	100.0	20	100.0	NA
	2nd attempt	0	0.0	0	0.0	
Cormack Grade	Grade 2	20	100.0	20	100.0	NA
	Grade 1	0	0.0	0	0.0	

NA: not available,

Table 6. Frequency distribution of vocal cord mobility status and positionof the studied groups

		Group A		Group B		P. value
		No.	%	No.	%	
Mobility	Not mobile	17	85.0	18	90.0	0.672 NS
	Partial mobile	3	15.0	2	10.0	
	Mobile	0	0.00	0	0.00	
Position	Fully abducted	17	85.0	18	90.0	0.672 NS
	Moderately opened	3	15.0	2	10.0	
	Adducted	0	0.00	0	0.00	

NS: not significant

Table 7. Comparison of duration of operation and duration from receiving reversal to the time of extubation of the studied groups

	Group A		Group B		P. value
	Mean	SD	Mean	SD	
Duration of operation	62.1	9.7	63.9	8.9	0.811 NS
Duration from receiving Reversal to the time of extubation	9.9	3.5	5.3	2.1	0.034 sig

SD: standard deviation of mean, ns: not significant, sig: significant

4. DISCUSSION

Airway management is a fundamental aspect of anesthetic practice and of emergency and critical care medicine. Endotracheal intubation (ETI) is a rapid, simple, safe and nonsurgical technique that achieves all the goals of airway management, namely, maintains airway patency, protects the lungs from aspiration and permits leak free ventilation during mechanical ventilation, and remains the gold standard procedure for airway management.

Laryngoscopy and ETI produce reflex sympathetic stimulation and are associated with raised levels of plasma catecholamine, hypertension, tachycardia, Myocardial Ischemia, depression of myocardial contractility, ventricular arrhythmias and intracranial hypertension. These responses may be particularly deleterious in patients with hypertension, IHD, myocardial dysfunction and raised intraocular and intracranial pressure.

Many drugs that tend to block the response to airway instrumentation May be used to blunt these noxious reflex responses. These include (fentanyl, alfentanil, lignocaine, a small dose of beta antagonist, sublingual nifedipine, and intravenous nitroglycerine), In our study we used MgSO4 to attenuate that response.

Our study showed that MgSO4 has a significant effect in attenuating the reflex sympathetic stimulation of laryngoscopy through minimizing the hemodynamic signs changes during the first 3 minutes of intubation, while it showed no significant attenuation effect after that.

Also, it showed that there is a significant prolongation of recovery time from muscle relaxant, although it does not affect the duration of surgery.

K. Montazeri MD*, M. Fallah MD concluded that pretreatment with different doses of magnesium sulfate have a safe decreasing effect on cardiovascular responses that is more effective than pretreatment with lidocaine(49). This study is similar to our study.

Abbady A. Ahmed found that the use of magnesium sulphate attenuates the stress response to laryngoscopy and intubation significantly (50). This study is similar to our study.

Gautam Piplai et al found that perioperative administration of magnesium sulphate (30 mg/kg bolus followed by 10 mg/kg continuous infusion) in patients undergoing lumbar spine surgery significantly reduced stress response to endotracheal intubation, anesthetic requirement along with significant reduction of postoperative shivering without any major adverse effects. Therefore, we conclude that IV magnesium sulphate may be a useful for spine surgery(51). This study is similar to our study.

Navid Nooraei et al found that Magnesium sulfate is more effective than lidocaine in controlling hemodynamics, although it may increase the heart rate(52). This study is similar to our study.

Dr. Santosh Kumar et al found that Systolic and diastolic blood pressure in MgSO4group when compared to the pre-operative values shows that after giving the study drug there is insignificant fall in SBP and DBP and MgSO4 itself causes tachycardia and also fails to attenuate rise in heart rate(53). This study shows different result than our study because they found that the test drug fails to attenuate the rising in heart rate.

5. CONCLUSIONS

Preoperative administration of magnesium sulphate (30 mg/kg) in patients undergoing lower abdominal surgery significantly reduced stress response to endotracheal intubation. Hence we suggest that MgSO4 is effective drug in attenuating the reflex sympathetic stimulation due to airway instrumentation and can be used in selected cases for that purpose.

We recommend conducting another study for the effect of MgSO4 with larger sample with monitoring of plasma level of MgSO4 that we failed to monitor in this study.

Ethical Clearance : Ethical clearance and approval of the study are ascertained by the authors. All ethical issues and data collection were in accordance with the World Medical Association Declaration of Helsinki 2013 of ethical principles for medical research involving human subjects. Data and privacy of patients were kept confidentially.

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