



EFFECT OF INTRAVENOUS MAGNESIUM SULPHATE ON PATIENTS UNDERGOING CRANIOTOMY FOR MENINGIOMA EXCISION

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ABSTRACT

A total of sixty patients scheduled for meningioma excision were divided into two groups of 30 each. Group M patients received 30 mg/kg of magnesium sulphate diluted up to 20 ml with 0.9% NS over 15 mins during preinduction time, followed by infusion of 10 mg/kg/hr. Intraoperatively till dura closure. Group C patients received 20 ml of 0.9% NS preinduction, followed by infusion intraoperatively till dura closure. The vitals were Recorded Pre-induction, Post-induction, Post-intubation, Intra-operatively and at 3rd, 6th, 12th and 24th postoperative hour. Post-operative magnesium levels were assessed immediate post op, 6th hour and 12th hour. The data obtained were statistically analysed using IBM SPSS software.

The demographic characters, baseline vitals & duration of surgery were comparable. Intraoperative HR, MAP, Inhalational agent, opioid & Neuromuscular blocker requirement were significantly lesser in group M ($p < 0.005$).

KEYWORDS : Meningioma, Meningioma Excision, Magnesium sulphate, Anesthetic adjuvant

INTRODUCTION

Meningioma is one of the most common benign tumor of the central nervous system accounting for 15-30% of the total^[1]. Meningioma is associated with a high incidence of seizure perioperatively and also meningioma surgeries are associated with higher bleeding tendencies intraoperatively, hence the management of meningioma is aimed at reducing the incidence of the seizures and decreasing the blood loss by inducing controlled hypotension^[2-4]. Various drugs like anti-epileptic drugs and hypotensive agents have been used for the perioperative management in the patients undergoing craniotomy for meningioma excision.

Materials and Methods (Patients and Methods)

This Prospective, double blinded, randomized, controlled study was aimed to determine the effect of magnesium sulphate on patients undergoing craniotomy for meningioma excision. After obtaining Institutional Ethical Committee clearance & informed consent. Sixty patients of age 18 to 60 years, undergoing craniotomy for meningioma excision electively under general anaesthesia at Gandhi medical college and Hamidia hospital satisfying the inclusion criteria were chosen for this study. The duration of the study was 18 month (from February 2018 to August 2019).

The patients included in the study were between the ages of 18 years to 60 years, ASA Physical status I, II & III, GCS score greater than or equal to 12 and undergoing supratentorial meningioma excision surgeries electively under general anaesthesia.

The exclusion criteria included patients who refused to give consent, age < 18 or > 60, ASA physical status IV and above, patients having extracranial meningiomas, patients undergoing bifrontal, trans nasal approach for meningioma surgeries, patients with Psychiatric disorders, Renal insufficiency (Gfr < 60 ml/hr), Cardiac disorders (heart block), Hepatic impairment (child Pugh score class c), Bleeding diathesis. Patients undergoing magnesium therapy or patients with hypermagnesemia (> 2.6 mEq/l). Unstable hemodynamic (severe hypotension or hypertension who receive antihypertensive and vasopressor before surgery but not include baseline oral antihypertensive drug were avoided in the study. A pregnant women, anyone with brain herniation. Patient who receive calcium channel blocker drug, on chronic

Anti-epileptic therapy, with uncorrected electrolyte abnormality, who are hypersensitive to any of the drugs in the study

The materials and drugs used for the study were magnesium sulphate 50% 2ml ampoule (0.5g/ml), thiopentone sodium vial, rocuronium 5 ml vial (10mg/ml), atracurium besylate, 5ml ampoule (10 mg/ml), Neuromuscular monitoring device, Bi-spectral Index monitoring, Pulse oximeter, Noninvasive blood pressure monitoring, Invasive blood pressure monitoring, Electrocardiogram, end tidal carbon dioxide, syringes and cannula, central venous cannula, 0.9% normal saline.

The sixty patients chosen for the study were randomized by sealed envelope method and divided into two groups of 30 patients each

GROUP M (I/V Magnesium sulphate Group)-30 patients received 30 mg/kg of magnesium sulphate diluted up to 20 ml with 0.9% NS over 15 mins during preinduction time, followed by infusion of 10 mg/kg/hr. intraoperatively till dura closure. Anaesthesia was standardized with Thiopentone, Fentanyl and Isoflurane.

GROUP C (I/V 0.9% Normal Saline Group)- 30 patients received 20 ml of 0.9% NS during preinduction time, followed by infusion intraoperatively till dura closure. Anaesthesia was standardized with Thiopentone, Fentanyl and Isoflurane

In the operating room, appropriate equipment for airway management & emergency drugs were kept ready. Patients were shifted to the operating room. Non-invasive blood pressure monitor, pulse oximeter and ECG leads were connected to the patient. Preoperative baseline heart rate, systolic, diastolic blood pressure (MAP) and oxygen saturation were recorded. Patients were cannulated with two 18 G intravenous cannula in the forearm. Invasive blood pressure monitoring was done via radial artery cannulation under local anaesthesia. All patients were Preloaded with 0.9% NS (5 to 7 ml/Kg). All the patients were premedicated with I/V inj Glycopyrrolate 0.2mg, I/V inj Midazolam 1mg, I/V ondansetron 4mg. Patients in Group M received 30 mg/kg of magnesium sulphate diluted up to 20 ml with 0.9% NS over 15 mins administered by a blinded observer. Patients in Group C

received 20 ml of 0.9% NS over 15 mins administered by a blinded observer. Following which induction was done with Fentanyl 2.5 g/kg and Thiopentone 5mg/kg. The Vitals (HR, MAP, SpO₂) were recorded post induction. Neuromuscular monitoring and BIS monitoring devices were attached to the patient. I/V inj Rocuronium 0.6 mg / kg was administered for muscle relaxation. Patient was intubated orally when appropriate intubating conditions were achieved with neuromuscular monitoring. The Vitals (HR, MAP, EtCO₂, SpO₂) were recorded post intubation at 5 mins. Patients were kept in PACU for 24 hours. The vitals were recorded at 3rd, 6th, 12th and 24th postoperative hour. Post-operative analgesia was achieved with fentanyl. Post-operative magnesium levels were assessed immediate post op, 6th hour and 12th hour. The patients were discharged from the PACU when Modified Aldrete discharge scoring was ≥ The incidence of Seizures was recorded in the postoperative period up to 7 days. Adverse effects if any were recorded. The sample size was estimated based on a pilot study. Data was collected on

individual basis by filling of the proforma. Statistical evaluation of data will be done using IBM SPSS statistics v 16.0. Categorical data was analysed by Chi square test, Z-test and nominal data were analysed students 't' test. A P-value less than 0.05 was considered to be statistically significant.

RESULTS

The demographic characters, baseline vitals & duration of surgery were comparable. Intraoperative HR, MAP, Inhalational agent, opioid & Neuromuscular blocker requirement were significantly lesser in group M (p < 0.005).

Table 1. Demographic characteristics and duration of surgery

Title	Group M	Group C	Test	P-value
Age (years)	39.5 ± 9.6	38.5 ± 10.5	t = 0.38	0.70
Weight (kg)	59.4 ± 5.3	58.1 ± 6.41	t = 0.85	0.39
Sex (male : female)	24 : 6	25 : 5	χ ² = 0.11	0.73
Duration of surgery	190.2320.43	198.418.8	t = 1.53	0.13

Table 2. Parameters monitored

PARAMETERS	GROUP M (MEANS.D)	GROUP C (MEANS.D)	P VALUE
HR(post induction, post intubation @5 min, 10,15,30,60,90,120,150,180,210mins)	78.443.0	84.721.80	<0.0001
MAP(post induction, post intubation @5min 10,15,30,60,90,120,150,180,210mins)	86.225.7	94.895.07	<0.0001
EARLY SEIZURE INCIDENCE (In the first 7 days of postoperative period)	8	12	0.27
NEUROMUSCULAR BLOCKERS usage (mg)	36.241.84	52.084.24	<0.0001
ISOFLURANE REQUIREMENT (to maintain BIS Between 40-60 values)	0.660.18	1.0960.12	<0.001
INTRA-OPERATIVE OPIOID REQUIREMENT (FENTANYL) (to maintain hemodynamics within 20% of baseline values)(g/kg/hr)	1.30.2	1.60.4	<0.0005

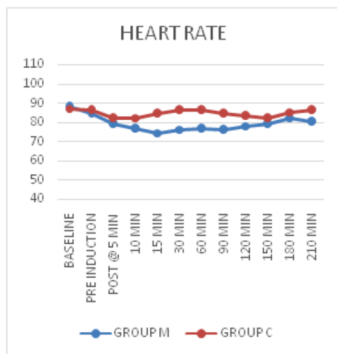


Figure 1. Graphical representation of Heart rate

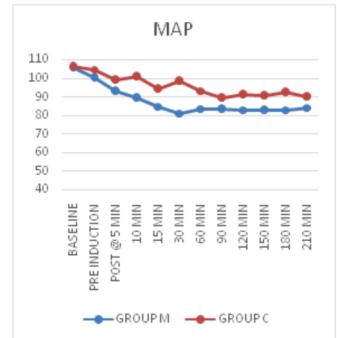


Figure 2. Graphical representation of Mean arterial pressure

Table 3. Adverse effects

ADVERSE EFFECTS	INCIDENCE		P-value
	GROUP M	GROUP C	
HYPOTENSION (requiring vasopressors)	7	8	0.82

PROLONGED NEUROMUSCULAR BLOCKADE	5	7	0.84
Signs of hypermagnesemia	nil	nil	nil

Table 4. Magnesium levels (MEq/L)

Group	Pre-op	Immediate post op	Post op 6 th hour	Postop 12 th hour
GROUP M	1.64 (0.06)	1.92 (0.13)	1.76 (0.07)	1.59 (0.05)
GROUP C	1.56 (0.04)	1.62 (0.09)	1.74 (0.08)	1.58 (0.09)
P-value	0.76	0.04*	0.72	0.84

DISCUSSION

This controlled, randomised double-blind study was designed to assess the effects of magnesium sulphate infusion on perioperative haemodynamics, anaesthetic agent consumption, intra-operative analgesia and seizure incidence in patients undergoing craniotomy for meningioma excision.

This study was formulated on the basis of the studies of Koinig H et.al, Rodriguez-Rubio L et.al and Manaa EM et.al who studied the effects of magnesium sulphate in General anesthesia.^[5-7]

In our study we found that the Hemodynamics- Heart Rate (HR) and Mean Arterial Pressure (MAP) were significantly lower in the Group M in comparison With Group C which was in accordance with the study of Elsharmouby NM et.al.^[8]

The incidence of Seizures in Group M even though lesser than that of Group C was not significantly lesser statistically similar to the study of Zeiler FA et.al.^[9]

The requirement of inhalational agent (ISOFLURANE) to maintain BIS score of 40-60 was significantly lesser in Group

M than in Group C. The requirement of Opioids was significantly lesser in Group M these results were in accordance to the study of Manaa EM et al.^[5].

There Was no Clinical Signs Of Hypermagnesemia. The incidence of Adverse effects were not significantly different between the two groups of study.

CONCLUSION

Magnesium sulphate is a good anaesthetic adjuvant in patients undergoing craniotomy for meningioma providing an Hypotensive anaesthesia, with decreased requirement of Inhalational Agents, opioids (Intra-op) decreased requirement of neuromuscular blockers without any significant adverse effects.

However there was no significant decrease in incidence of early postop seizures

Acknowledgement

The authors report no conflict of interests.

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