

## Effect of magnesium sulfate on the total anesthetic and analgesic requirements in neurosurgery

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**Background:** Anesthesia for neurosurgery requires balancing deep and effective anesthesia as well as postoperative analgesia versus the risks of delayed recovery and postoperative respiratory depression. Magnesium sulfate is an antagonist of the N-Methyl-D-Aspartate (NMDA) receptors in a voltage-dependant fashion when co-administered with propofol potentiates anesthetic effect and NMDA antagonism of propofol. This randomized, placebo-controlled, double-blind study was designed to evaluate the effect of magnesium sulfate on the total anesthetic and analgesic consumption using the clinical parameters in addition to the bispectral index (BIS) and neuromuscular monitoring using train-of-four (TOF).

**Patients and Methods:** This study included 60 adult male and female patients, ASA physical status I and II, and undergoing neurosurgical procedures. Patients were randomly allocated into 2 equal groups. Patient in group I (magnesium group) received magnesium sulfate (20 mg/kg) as bolus dose over 5 minutes before induction of anesthesia, followed by (10 mg/kg/h) as infusion. While, patient in group II (control group) received saline with the same bolus and infusion rates. Routine intraoperative monitoring was connected including heart rate HR (beats/min), arterial blood pressure (MAP), ECG, Spo2, Etco2 and temperature. In addition to TOF and BIS were also applied. All patients were induced by fentanyl (2µg/kg), propofol (1.5-2 mg/kg) and rocuronium in a dose of (0.6 mg/kg) to facilitate tracheal intubation. This was followed by continuous infusion of propofol (6-10 mg/kg/h) and fentanyl (1-2 µg/kg/h). The parameters of assessments included HR, MAP, BIS and the total intraoperative anesthetic consumptions. The anesthesia and the recovery time were also recorded. In addition, the postoperative pain scores by visual analog scale (VAS) and the total analgesic requirements of morphine during the 1st 24 hours were recorded.

Dr. Manaa, Assistant Professor, Anesthesia Department, Faculty of Medicine, King Khalid University Hospital, King Saud University, Saudi Arabia and Assiut University Hospital, Egypt. Dr. Manaa is interested in the field of neuroanesthesia. He is ACLS & BLS instructor and secretary general of the research committee in KKUH. He has completed his MD degree in 2000. He has more than 32 publications and 4 book chapters. He is serving in the editorial board of 6 journals and as a reviewer for 21 medical journals. He supervised many thesis works for master and doctorate degrees.

**Results:** There were no significant differences in patient characters between the two groups. Both the HR/min and MAP showed significant reductions ( $p < 0.05$ ) in group I (Magnesium Group) compared to the control group. There was no significant difference in BIS values between both groups. Results also showed that the total consumptions of fentanyl, propofol and rocuronium were significantly less in the magnesium group in comparison to the control group ( $P < 0.05$ ). The anesthesia time showed no significant difference ( $P > 0.05$ ), while the recovery time was significantly shorter ( $P < 0.05$ ) in the magnesium group compared to the other group. The postoperative pain scores as well as the total analgesic requirements of morphine were significantly lower in the magnesium group compared to the control group.

**Conclusion:** Magnesium sulfate is a safe and cost-effective supplement to general anesthesia in neurosurgery as it reduces the total anesthetic and analgesic requirements as well as post-operative pain.

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