COMPARISON OF PERIOPERATIVE MAGNESIUM SULPHATE INFUSION WITH PLACEBO FOR POSTOPERATIVE ANALGESIA.

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ABSTRACT: Adequate control of post-operative pain is very essential to reduce discomfort and early recovery after surgery. Role of adjuvant drugs along with conventional analgesic drugs have gained popularity in recent years, out of which MgSO₄ is one of them. Objectives: To compare mean duration of postoperative analgesia between perioperative infusion of magnesium sulfate versus placebo in patients undergoing upper abdominal surgery. Setting: Nishtar Medical University/Hospital Multan. Study Design: Randomized Controlled Trial. Material and Methods: A total number of 100 patients admitted for upper abdominal surgery in the Department of Surgery, Nishtar Hospital Multan were included in this analysis. Group A received 50 mg/kg i/v of MgSO₄ in 0.9% N/S at induction and 15 mg/kg MgSO₄ per hour, 6 hours postoperatively. While group B received 100 ml of 0.9% N/S at induction and 500 ml of 0.9% N/S 6 hours postoperatively. Post-op pain score was noted at 01 and 06 hours after surgery. Time for requirement of first rescue analgesia was also noted. Results: Mean post-op pain (VAS score) after 01 hour of surgery was 2.7+0.43 in MgSO₄ group versus 4.1+0.82 in control group (p-value <0.001). VAS score after 06 hours was 1.9+0.31 in MgSO₄ group versus 2.3+0.63 in control (p-value <0.001). Time of first rescue analgesia was prolonged in MgSO₄ group; 105.9+12.7 minutes versus 67.8+15.3 minutes in control group with p-value <0.001. Conclusion: Magnesium sulfate increases the duration of postoperative analgesia and can be used as an adjunct since this molecule is inexpensive, relatively harmless, and the biological basis for its potential anti-nociceptive effect is promising.

Key words: Magnesium Sulphate, Post-op Pain, Upper Abdominal Surgery.

INTRODUCTION
Adequate control of post-operative pain is very essential to reduce discomfort and early recovery after surgery. Inadequate pain management is a major risk of increased morbidity and quality of life after surgery.¹ Pain alters the body physiology in many ways. Pain increases heart rate, blood pressure, oxygen consumption and minute ventilation. Pain causes anxiety, depresses immune system and increase release of catabolic hormones. Postoperative pain falls in category of acute pain which is sharp, lacerating in character.²,³

Commonly employed methods for treating postoperative pain are conventional use of opioids, NSAIDS & paracetamol through various routes, central neuraxial blocks, peripheral nerve blocks, local anesthetic infiltration of wound.⁴⁻⁷ Moreover, nonconventional therapy for postoperative pain includes use of adjuncts to conventional therapy like MgSO₄, Clonidine, Reserpine, Neostigmine, use of antidepressants and anticonvulsants, transcutaneous electrical nerve stimulation (TENS), acupuncture, radiofrequency ablation (RFA), cryoanalgesia and rhizotomy.⁸⁻¹⁰ In addition to relieve pain, MgSO₄ is also used in treatment of torsade de pointes, quinidine induced arrhythmias, as a bronchodilator in severe asthmatic attacks, as anticonvulsant in eclampsia, to delay preterm birth, to prevent cerebral palsy in preterm babies, calcium channel blocker over dosage and migraine and is recommended in various text books of different specialties.¹¹
Magnesium exerts its analgesic activity by acting on NMDA receptors. It has been used from several decades for management of pain. Among the various routes of administration, the systemic route is the preferred one. Some studies have found that the use of MgSO\(_4\) is beneficial, while some have reported opposite results. A meta-analysis by Guo et al. have concluded that MgSO\(_4\) is beneficial for prevention of post-operative pain, but data is still pre-mature in published trials to draw conclusion that MgSO\(_4\) should be administrated routinely for post-operative pain management. So the present study is designed to compare mean duration of postoperative analgesia between perioperative infusion of magnesium sulfate versus placebo in patients undergoing upper abdominal surgery.

**METHODOLOGY**

A total number of 100 patients of ASA grade I and II, who had to undergo different types of elective surgery for upper abdomen like cholecystectomy, gastrostomy, liver abscess, right hemicolectomy from March-2018 to Dec-2018 was included in this study.

Patient with prior surgery, on calcium channel blocker, renal dysfunction, major systemic illness, history of neuropathy, myopathy were excluded. The study was conducted in the department of general surgery Nishtar Hospital Multan.

The sample size for this study is based on the results of study of Kiran et al., by taking VAS score 1.32±0.84 in MgSO\(_4\) group and 1.32±0.84 in placebo group after 4 hours of surgery. At power of the test 80% and level of significance 5.0%. the sample size was 23 patients in each group. We took 50 patients in each group to make the study results more accurate.

All the patients were preoperatively examined in detail to get detailed clinical history and basic demographic information. On the morning of surgery, we divided patients randomly into two groups by Draw Method. Group A received 50 mg/kg I/v of MgSO\(_4\) in 0.9% N/S at induction and 15 mg/kg MgSO\(_4\) /hour, 6 hours postoperatively. While group B received 100 ml of 0.9% N/S at induction and 500 ml of 0.9% N/S 6 hours postoperatively.

All the patients received inj. Midazolam (0.1 mg/kg) and Nalbuphine (0.1 mg/kg) for premedication. For induction we used Inj. Propofol (2 mg/kg), Atracurium (0.5 mg/kg), \(\text{N}_2\text{O}+\text{O}_2\) (60:40) and Sevoflurane titrated to keep B.P +20% of baseline value for maintenance, inj. Atropine (0.02 mg/kg) and inj. Neostigmine (0.05 mg/kg) postoperatively for reversal of neuromuscular blockade.

Total duration of analgesia, and time for requirement of first rescue analgesia was noted. Inj. Tramadol 2–3 mg/kg iv was as rescue analgesic.

Data analysis was performed using SPSS v23. Independent sample t-test was used for comparison of age, VAS pain score and time for requirement of first analgesia. Gender and type of surgery was compared using Independent sample t-test. P-value <0.05 was considered significant.

**RESULTS**

In Table-I, data of patients’ demographics and types of procedures is presented. There was no difference (statistically) in age, gender and BMI between the MgSO\(_4\) and control group. Indications of surgical exploration were liver pathology in 11% patients, gallbladder pathology in 48% patients stomach cancer in 14% and cholo-rectal pathology in 27% patients.

Mean post-op pain (VAS score) after 01 hour of surgery was 2.7±0.43 in MgSO\(_4\) group versus 4.1±0.82 in control group (p-value <0.001). VAS score after 06 hours was 1.9±0.31 in MgSO\(_4\) group versus 2.3±0.63 in control (p-value <0.001). Time of first rescue analgesia was prolonged in MgSO\(_4\) group; 105.9±12.7 minutes versus 67.8±15.3 minutes in control group with p-value <0.001 (Table-II).
DISCUSSION
Post-op pain is a major risk of psychological and physical trauma in the operated patients. Therefore, anesthetists have tried various drugs and techniques to reduce its incidence. MgSO$_4$ is one of these drug, it is a NMDA receptor antagonist and have analgesic properties. Its blocks NMDA receptors activity by antagonizing calcium channels of different voltage.

In present study we evaluated the role of peri-op MgSO$_4$ infusion in patients of upper abdominal surgery. We found lower post-op pain and longer duration of analgesia by using MgSO$_4$ as compared to the control group.

In a study by Usmani et al. also found beneficial effects of magnesium infusion. They found mean VAS score 4.5 in MgSO$_4$ versus 5.6 in control group after 01 hour and 4.3 versus 4.0 after 6 hours respectively.

Shah et al. conducted a study on intra-op MgSO$_4$ administration in patients under spinal anesthesia. they found mean analgesia time of 154.89 ± 18.73 minutes in MgSO4 versus 120.52 ± 11.12 minutes in control group. The authors concluded that the MgSO$_4$ infusion reduces and delays the need of rescue analgesics.

Ghaffaripour et al. did not found any significant effect of MgSO$_4$ infusion, they reported mean VAS score of 3.89+1.19 in MgSO$_4$ versus 3.85+0.87 in control group with insignificant difference.

Kogler evaluated the role of MgSO$_4$ during thoracotomy procedures. They found significant reduction in the requirements of sedative drugs, but the author did not found any significant difference in post-op pain score between the groups.

Taheri et al. uses low dose of MgSO$_4$ in patients undergoing hysterectomy under general anesthesia. they found significant effects of lower dose of MgSO$_4$ on post-op pain. More-over the authors gave only single dose of magnesium and found it effective in reducing post-op pain.

CONCLUSION
Magnesium sulfate increases the duration of postoperative analgesia and can be used as an adjunct since this molecule is inexpensive, relatively harmless, and the biological basis for its potential antinociceptive effect is promising.

REFERENCES


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