Magnesium Infusion for Analgesia in Critically Injured Trauma Patients: A Randomized Controlled Trial

Diego R Anaya BS[1], Lauren Coleman MD[2], Gillian Hoshal MD[2], Christine Cocanour MD[2]
[1]UC Davis School of Medicine, [2]UC Davis Department of Surgery

Introduction

- Effective methods of multimodal pain control management are necessary, and multiple non-opioid regimens have been investigated
- Magnesium has been shown to reduce central sensitization through inhibition of calcium entry into cells by blocking NMDA receptors[2]
- Magnesium also reduces pain and opioid requirements postoperatively when used in conjunction with Vitamin C[1] and Ketamine[3]

Objective

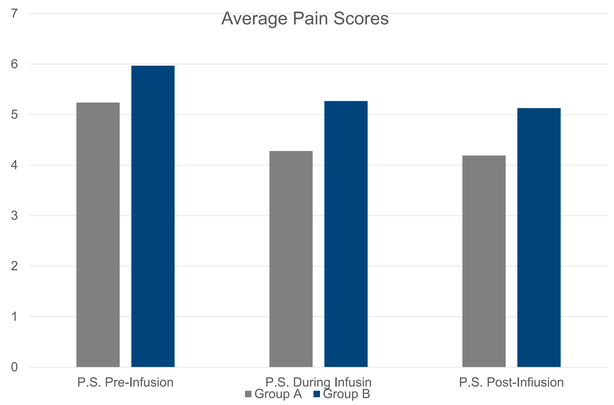
Demonstrate the effectiveness of continuous, intravenous administration of magnesium sulfate in decreasing pain and opioid requirements in critically injured trauma patients when compared with placebo

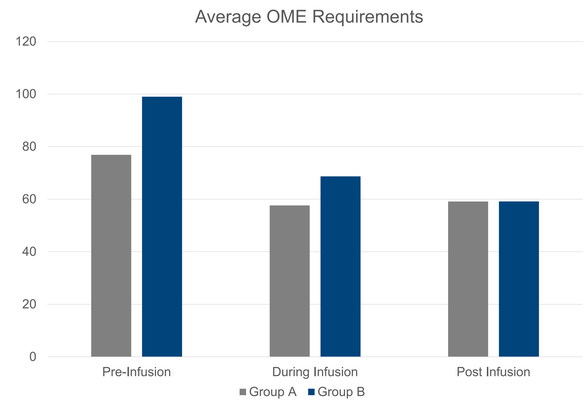
Design/Sample

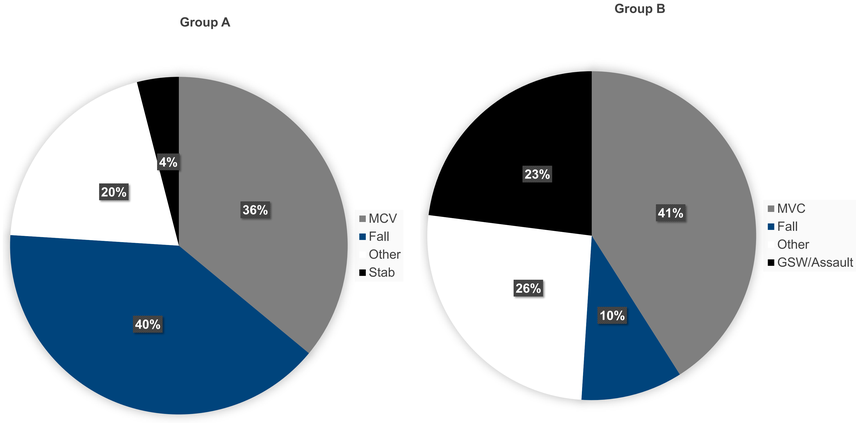
- Patients meeting inclusion criteria were randomly assigned into the magnesium sulfate or placebo group
- The magnesium sulfate group received a loading dose of 40mg/kg followed by a continuous infusion at a rate of 0.5 mg/hour (max duration: 24 hours)
- The placebo group received the same loading dose and infusion rate of normal saline
- Oral morphine equivalents (OMEs) and pain scores were recorded before, during, and after infusion
- Patients were monitored for possible adverse effects of magnesium, including bradycardia, dysrhythmia, respiratory depression and Richmond Agitation-sedation scale (RASS) of -3 to -5

Results

- 55 patients have been included in the study thus far (69% male, median age 49)
- Average Injury severity score (ISS) was 19.9 in Group A and 16 in Group B
- Average pain scores were lower for all three phases of infusion in Group A compared to group B
- Average OMEs for Group A were lower pre and during infusion compared to group B
- OME requirements between the two groups were nearly identical in the 24 hours post-infusion







Mechanisms of Injury in Groups A and B

	Group A (n=27)	Group B (n=28)
Median Age, Mean Age (years)	*56, 53*	*43, 44*
Age Range (years)	*20-87*	*19-74*
Sex	*59% male*	*82% male*
Race	*Caucasian, 59% Latino/hisp, 11% Other, 4% Unknown, 15% Asian, 4% Black, 7%*	*Caucasian, 60% Latino/hisp, 18% Other, 14% Unknown, 4% Asian, 4%*

Demographics for Groups A and B

Summary

- Despite having a higher average ISS, patients in Group A had lower average pain scores and OME requirements in the 24 hours prior-to and during infusion
- As the study is ongoing, blinding remains in place, so it is unknown whether Group A is receiving the magnesium sulfate or placebo
- With regards to adverse events, there has been 1 instance of brief respiratory depression in Group B; no adverse events have occurred requiring cessation of study drug

Next Steps

- Study accrual is ongoing (38% of total currently)
- Data will be unblinded upon max accrual for statistical analysis

References

1. Moon, Sungho, et al. “Additional Effect of Magnesium Sulfate and Vitamin c in Laparoscopic Gynecologic Surgery for Postoperative Pain Management: A Double-Blind Randomized Controlled Trial.” *Anesthesia and Pain Medicine*, vol. 15, no. 1, 31 Jan. 2020, pp. 88–95, www.ncbi.nlm.nih.gov/pmc/articles/PMC7713852/, 10.17085/apm.2020.15.1.88.
2. Shin, Hyun-Jung, et al. “Magnesium and Pain.” *Nutrients*, vol. 12, no. 8, 23 July 2020, p. 2184, 10.3390/nu12082184.
3. Varas, Verónica, et al. “Intraoperative Ketamine and Magnesium Therapy to Control Postoperative Pain after Abdominoplasty And/or Liposuction: A Clinical Randomized Trial.” *Journal of Pain Research*, vol. 13, 16 Nov. 2020, pp. 2937–2946, www.ncbi.nlm.nih.gov/pmc/articles/PMC7678693/, 10.2147/JPR.S276710.

Acknowledgements

I would like to thank Dr. Lauren Coleman and Dr. Christine Cocanour for including me in the study as well as fellow co-investigators, Dr. Gillian Hoshal, Jessica Duby, Jin Lee, and Gabby Echt.