

Impact of Ketamine on Opioid Utilization in Patients with Pre-existing Opioid Tolerance Undergoing Lumbar Spinal Fusion Surgery

Christian Bolton MD, Joseph Raffel MD, Eric Middleton BS, Paul Allen MD PHD, Trey Henderson, MSc, Julia Vanzyl, M.D., Chayawat Indranoi, Ph.D Jason Buehler MD
Department of Anesthesiology University of Tennessee Graduate School of Medicine, Knoxville, Tennessee, United States

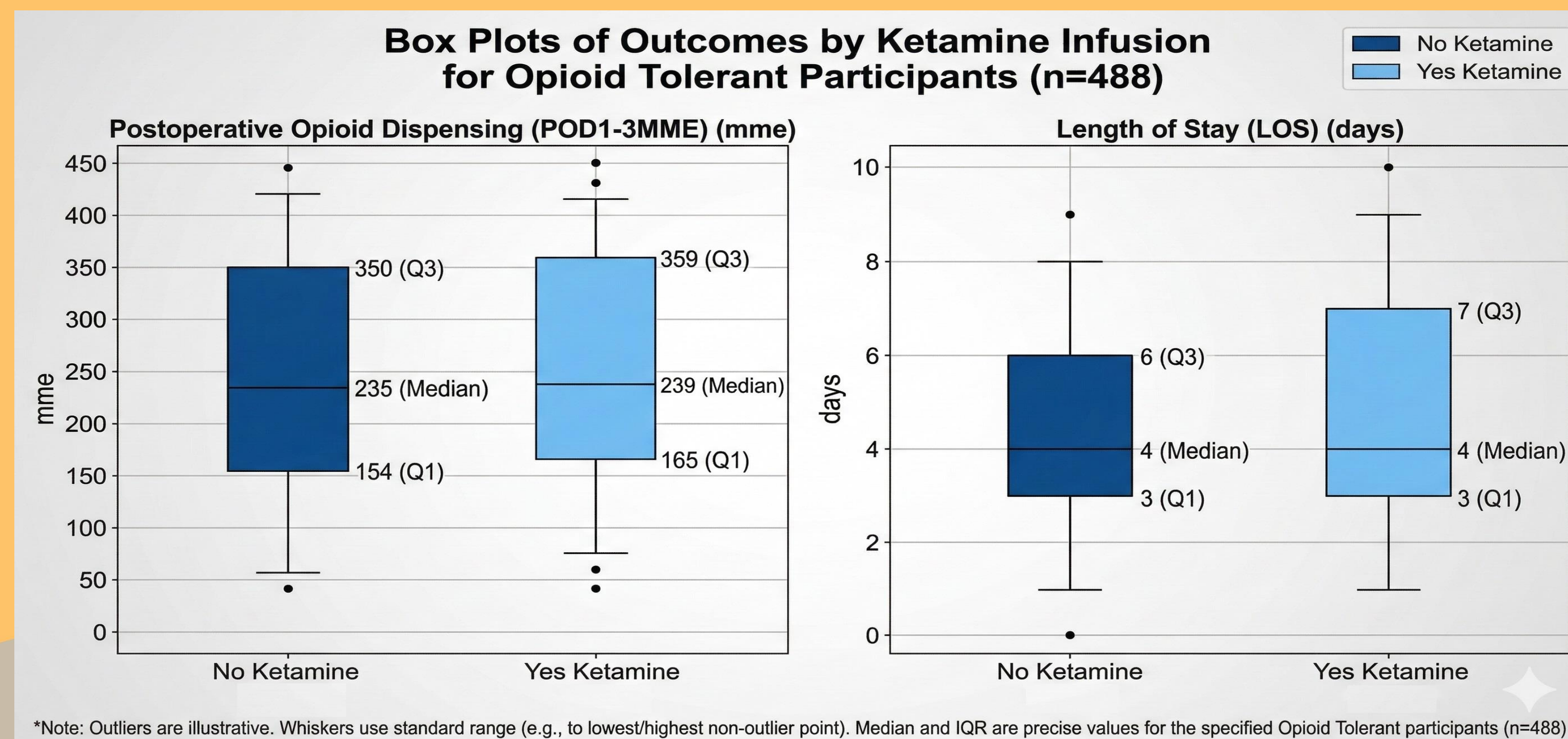
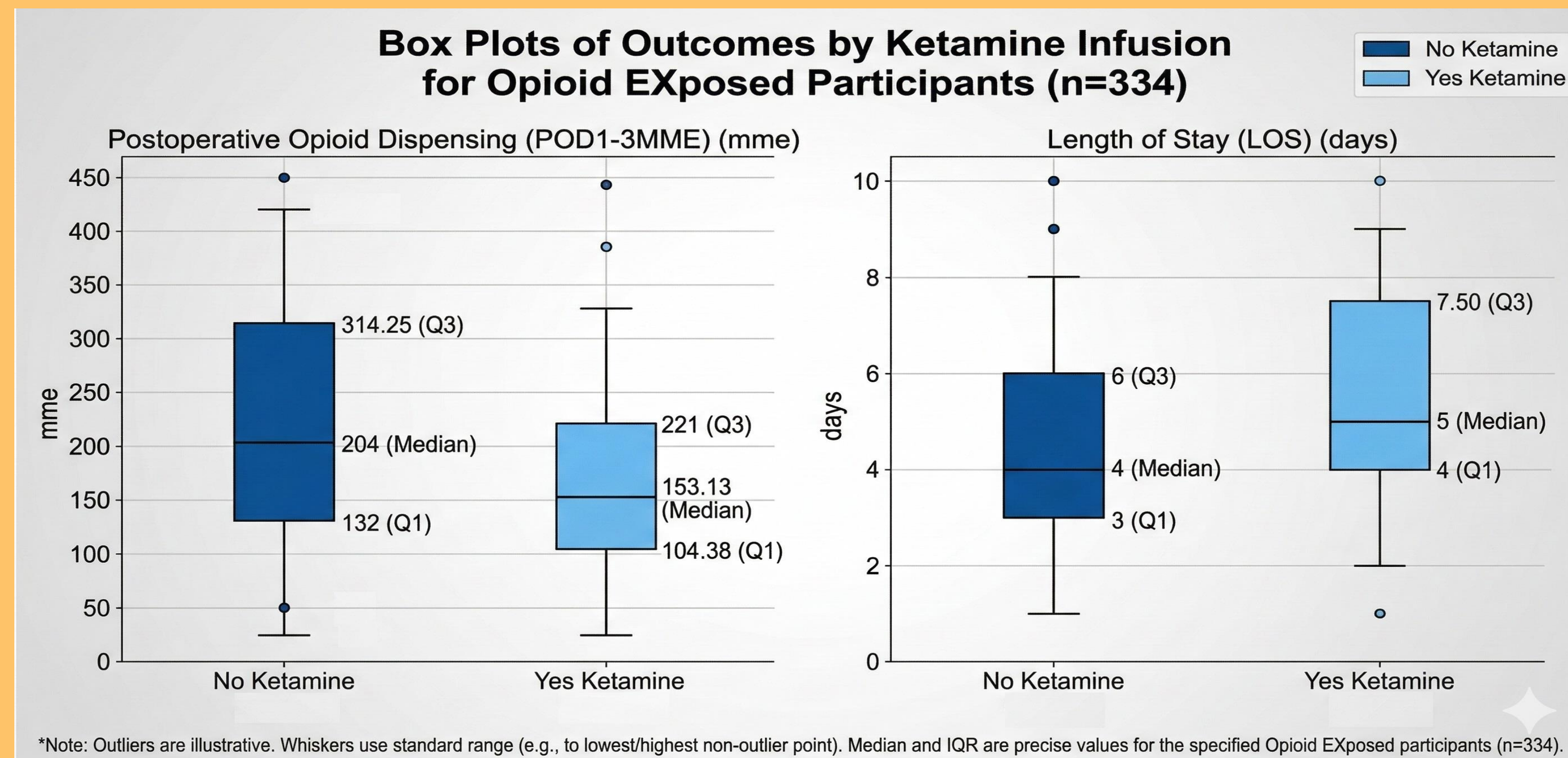


Introduction:

Lumbar fusion surgery causes significant postoperative pain. Many of these patients are opioid tolerant due to long-term preoperative opioid use, complicating postoperative analgesic management. Ketamine use demonstrates opioid-sparing effects with reduced pain scores and fewer adverse events in various procedures, including lumbar fusion [1-5]. However, research on its effects in patients with defined opioid tolerance remains unclear. This study aimed to evaluate ketamine as a postoperative analgesic adjunct in opioid tolerant patients undergoing lumbar fusion.

Materials and Methods:

This was a single center retrospective cohort study of 2,466 patients who received lumbar fusion surgery at the University of Tennessee Medical Center from 2017 through 2023. Patients were assigned to one of three groups based on their opioid tolerance status as measured in morphine milligram equivalents (MME) per day prior to procedure. These included opioid naïve (< 30 MME), opioid exposed (30-60 MME), and opioid tolerant (>60 MME). The opioid exposed and opiate tolerant groups of patients were further divided into postoperative ketamine infusion or control subgroups. Opiate naïve patients did not receive ketamine. This cohort was also compared against a historical opioid naïve cohort to assess for secular changes across the hospital. The primary outcome measured was post-operative length of stay (LOS), with secondary outcomes of opioid utilization in the first 72 hours postoperatively.



Results:

Baseline demographics were similar among groups. Both opioid exposed and opioid tolerant patients receiving ketamine showed an increased LOS compared to their respective control groups. Only opioid exposed patients receiving ketamine had significantly lower opioid requirements on postoperative day (POD) 1-3 compared to those who did not receive ketamine. There was no significant reduction in opioid tolerant patients receiving ketamine on POD 1-3 compared to those who did not receive ketamine.

Discussion:

Perioperative ketamine infusion significantly reduced postoperative opioid requirements in opioid exposed, but not tolerant patients. This interesting finding may be due to tolerance physiology, but warrants further research. The opioid sparing benefit in opioid exposed patients was limited to POD 1-3. The ketamine infusion could reasonably be discontinued after POD 3, while still achieving the opioid sparing effects. The increased length of stay observed in patients receiving ketamine is unlikely to be explained by secular changes across the hospital. There was a system-wide reduction in opioid prescribing over time, but no change in LOS.

References:

1. Yuan J, Chen S, et al. Intraoperative Intravenous Infusion of Esketamine Has Opioid-Sparing Effect and Improves the Quality of Recovery in Patients Undergoing Thoracic Surgery: A Randomized, Double-Blind, Placebo-Controlled Clinical Trial. PMID: 36608010
2. Huda AU, Minhas R, et al. Intravenous ketamine in gynaecological surgeries reduces pain score and opioid consumption. PMID: 37246675
3. Mariscal G, Morales J, et al. Meta-analysis of the efficacy of ketamine in postoperative pain control in adolescent idiopathic scoliosis patients undergoing spinal fusion. PMID: 36253657
4. Murphy GS, Avram MJ, et al. Perioperative Methadone and Ketamine for Postoperative Pain Control in Spinal Surgical Patients: A Randomized, Double-blind, Placebo-controlled Trial. PMID: 33730151
5. Brinck ECV, Maisnieme K, et al. Analgesic Effect of Intraoperative Intravenous S-Ketamine in Opioid-Naïve Patients After Major Lumbar Fusion Surgery Is Temporary and Not Dose-Dependent: A Randomized, Double-Blind, Placebo-Controlled Clinical Trial. PMID: 32167978

Cohort	Post-op Opioid Use	LOS	Interpretation
Naïve	↓	↔	Secular opioid reduction
Exposed	↓	↑	Ketamine reduces opioid use, increases LOS
Tolerant	↔	↑	No opioid-sparing benefit, increases LOS