Correlation between Number of Spinal Levels Involved in Surgery and the Amount of Analgesia Required for Pain Control

Primary Author: William Lavelle, MD
Upstate Medical University

Co-Authors: Elizabeth Demers Lavelle MD; Alexander Edelstein, BS; Katherine Sullivan, Mike Sun, MD; Richard Tallarico, MD; Swamy Kurra, MBBS

Introduction: Patients who undergo lumbar spinal fusion surgery often experience a significant amount of postoperative pain. One of the most common classes of medications used to treat this pain is opioids. The purpose of this study was to determine if there is a correlation between amount of opioids dosage and number of operative levels in lumbar spine surgery.

Methods: This was a retrospective study looking at patients who had open lumbar spine surgery (between June 2016 and December 2016) obtained through surgery case logs. Inclusion criteria: patients with lumbar stenosis, neurogenic claudication, and were greater than 18 years old. Exclusion criteria: lumbar fractures, lumbar infections, lumbar tumors, and revision surgeries. ISTOP (Internet System for Over-Prescribing) records were utilized to obtain patients’ opioid usage data. 58 consecutive patients who met the inclusion criteria were categorized based on number of operative levels: Group 1 (1 level, n=2), Group 2 (2 levels, n=14), Group 3 (3 levels, n=20), Group 4 (4 levels, n=10), and Group 5 (5 levels, n=12). Subgroups were formed based on interbody fusions (yes/no). Total morphine equivalents (TMEs) for each patient over the 30 days preoperatively, as well as for 1-month, 3-month and 6-month postoperatively were calculated and compared among groups (operated levels), as well as in subgroups among the operated levels. An ANOVA test was utilized for continuous variables and Chi Square test was used for categorical variables. P≤0.05 was considered as statistically significant.

Results: Study sample n=58; Mean age 59 years (range: 19 to 80 years); gender (males: 35 (60%), females: 23 (40%)). The mean number of operated levels were 3.3 (range 2 to 5), 17 patients (29%) received interbody fusions. The study mean Charlson Comorbidity (CCI) score was 0.7 (range 1 to 10) and American Society of Anesthesiologists (ASA) score was 2.6 (range 2 to 4). Preoperative 1-month TMEs were no different among the groups: patients who had undergone 3 operated levels were on high opioid dosages (434 TMEs) and patients with 4 operated levels were on low opioid dosage (91 TMEs), preoperatively. TMEs were reduced at third and sixth month postoperatively compared to preoperatively, but there was no difference in TMEs among the groups. (Table 1) Subgroup 1: In patients who had interbody fusions, there was no difference in preoperative, immediate postoperative, and 3-month postoperative TMEs among operated levels, but there was significantly higher TMEs for five operated levels (750 TME) compared to two operated levels (120 TME), (p<0.001) at 6-month postoperatively. (Table 2) Subgroup 2: Patients who did not undergo interbody fusion, 3 operated levels were on a higher dosage of morphine preoperatively (537 TME) (p=.006). At the 6-month postoperatively, 3 operated levels patients were using a higher dosage of
opioids (p=.0016). (Table 3) Patients who had a lower number of operated levels had a shorter length of stay than patients who had a higher number of operated levels.

Conclusion: In patients who did not undergo interbody fusion, there was no significant difference between opioid dosage and number of operated levels postoperatively. At 6 months, patients with a greater number of operated levels and who received interbody fusions were on higher doses of opioids. The small study sample and the retrospective nature of the study are the limitations.