



Chronic opioid use after spine surgery: what is the prescription for reducing opioid dependence?

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In recent years, there is increasing recognition of the risks of perioperative opioids including acute tolerance and persistent opioid use. Further complicating this issue, is the non-scientific prescription of opioids at discharge which significantly increases the risks of unused opioids in the community and diversion. Investigating perioperative factors associated with persistent opioid use is critical and timely due to the current opioid epidemic.

Preoperative opioid use impacts postoperative opioid usage. Kalakoti *et al.* compared differences in opioid use in the year following lumbar spine surgery between preoperative opioid users and opioid naive patients to identify potential risk factors for opioid dependence (1). The authors retrospectively collected opioid prescription data from 26,553 patients from an insurance registry. More than 58 percent of patients were prescribed opioids in the 3 months prior to surgery. Significantly more of these patients continued to be prescribed opioids 1 year after surgery compared to those patients who were opioid naive prior to surgery. Among patients undergoing anterior lumbar interbody fusion (ALIF), the strongest predictor of opioid use at 1-year was preoperative opioid use. Other risk factors included younger age, history of depression, anxiety, fibromyalgia and a history of drug abuse. In patients undergoing posterior/transforaminal lumbar interbody fusion (P/TLIF), older age was a risk factor for chronic opioid use.

These results are consistent with a prior study by Armaghani *et al.* which found that depression and anxiety are risk factors of chronic postoperative opioid use (2). Other risk factors include more invasive surgery, revision surgery and greater preoperative opioid use (3). In a subsequent study, the authors found that preoperative opioid use was associated with increased length of hospital stay for patients undergoing spinal fusion (4).

However, in a retrospective study of 1,477 patients undergoing major spine surgery from our institution, psychological risk factors were not associated with chronic opioid use at 1 year (5). The strongest contributing risk factor was preoperative opioid use, similar to Kalakoti's findings. There were several limitations to Kalakoti's study. The authors did not evaluate other surgical factors such as operative time or surgical invasiveness (6), which may be associated with increased inflammation, postoperative pain and opioid requirement. This was accounted for in Armaghani *et al.*'s study which found that revision surgeries and increased invasiveness lead to higher risk of opioid dependence 1 year postoperatively (3). In contrast, another study focusing only on lumbar fusions found no significance in opioid requirements in relation to the number of levels fused (7). Kalakoti *et al.* did report small differences in risk factors for opioid use for ALIF *vs.* P/TLIF procedures, but noted that there was likely minimal clinical relevance to these findings. Overall, specifics of the spine surgery

performed are important to consider for postoperative pain control, and affect opioid usage in the long run.

One of the greatest challenges in studying risk factors for postoperative opioid use is how to reliably measure opioid consumption. In their current study, Kalakoti *et al.*'s used opioid prescription data as surrogate for opioid use, reporting the percentage of patients who filled a prescription for opioids at various time points during the year after surgery. Their results showed a significant difference in prescribed opioids between opioid users and opioid naive patients. This difference was greatest at the 3-month mark, where prescription rates declined to 13.9% for opioid naive patients compared to 53.8% for opioid users (1). The trend leveled off between 6 to 12 months, showing a higher prescription filling rate in preoperative opioid users at 12 months.

However, opioid prescription data does not directly correlate to opioid consumption. Furthermore, it does not account for pro re nata (PRN) dosing. One way of estimating opioid usage is to correlate the amount of opioid prescribed to the number of filled opioid prescriptions using state-sponsored prescription monitoring programs (PMP) (7). These programs record the number of filled opioid prescriptions from different providers and may help identify potential for opioid abuse. Other measures of opioid use, such as direct patient interview or questionnaire have been used but may also underestimate opioid use.

Many studies focus primarily on preoperative risk factors that influence postoperative opioid use, but do not take into account perioperative interventions. Previous studies have shown that use of non-opioid analgesics may reduce pain and opioid use during the perioperative period. Patients randomized to receive an intravenous lidocaine infusion had decreased postoperative pain, morphine consumption and improved functional recovery 3 months after surgery, as measured by short form-12 physical composite scores (8). In patients chronically using opioids prior to surgery, intravenous ketamine was shown to reduce opioid consumption at 24 h and 6 weeks after spine surgery (9). This has led to the development of opioid-sparing enhanced recovery protocols for spine surgery which may lead to improved pain scores, reduced opioid consumption (10). The long-term effect of multimodal analgesic regimens on chronic opioid use and recovery after spine surgery is an area for future study. Given the disparity in results, limited data on perioperative anesthetic and surgical factors and unreliable documentation of postoperative opioid use, the development of a clinical applications tool to identify

patients at risk for chronic opioid use may be challenging but is absolutely necessary.

Recent studies have helped to identify trends in chronic opioid use after spine surgery. These clinical risk factors may one day be used to identify patients at risk for chronic opioid dependence preoperatively and target them for perioperative interventions such as psychological counseling, use of multimodal analgesic regimens and rationale postoperative opioid prescribing that may help to reduce the risk of chronic opioid use in this patient population.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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