

Perioperative Pain Management for the Chronic Pain Patient With Long-Term Opioid Use

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In the United States nearly one in four patients presenting for surgery reports current opioid use. Many of these patients suffer from chronic pain disorders and opioid tolerance or dependence. Opioid tolerance and preexisting chronic pain disorders present unique challenges in regard to postoperative pain management. These patients benefit from providers who are not only familiar with multimodal pain management and skilled in the assessment of acute pain, but also empathetic to their specific struggles. Chronic pain patients often face stigmas surrounding their opioid use, and this may lead to underestimation and undertreatment of their pain. This article aims to review the challenges presented by these complex patients and provide strategies for treating acute postoperative pain in opioid-tolerant patients.

Chronic Pain and Long-Term Opioid Use

The burden of chronic pain in the United States is staggering. A National Health and Nutrition Examination Survey found that, in 2002, 14.6% of adults described localized or widespread chronic pain lasting greater than 3 months. Another survey in 2003 determined that 43% of adults in the United States suffer from musculoskeletal pain conditions of various durations. Perhaps this prevalence of chronic pain led to the current rising trend of prescription opioid medications. The Centers for Disease Control and Prevention (CDC) estimates that 9.6 million to 11.5 million adults (equivalent to 3%–4% of the adult U.S. population) received a prescription for long-term opioid therapy in 2005. The trend continued from 2007 to 2012, as opioid prescriptions per capita increased 7.3% (Dowell, Haegerich, & Chou, 2016).

Opioids continue to be prescribed routinely for managing chronic pain. The CDC now estimates that one in five patients in the United States with noncancer pain is prescribed opioids in office-based settings for pain complaints. Adults 40 years and older, women, and non-Hispanic whites are most likely to be prescribed opioids (CDC, 2017).

This widespread use of opioids has implications in the perioperative setting. Recently, a cross-sectional, observational study evaluated the prevalence and

patterns of preoperative opioid use. Approximately one in four patients undergoing surgery in the study reported preoperative opioid use (23.1% of the 34,186-patient study population). Opioid use was most common in patients undergoing orthopaedic spinal surgery (65%). This was followed by neurosurgical spinal surgeries (55.1%). Hydrocodone bitartrate was the most prevalent medication. Tramadol and oxycodone hydrochloride were also common (Hilliard et al., 2018).

Given this significant population of surgical patients with established opioid use, it is imperative for both nurses and all other providers to gain an understanding of the complex challenges chronic pain patients introduce to the postoperative setting.

Definitions

Common pain terminology as defined by the International Association for the Study of Pain, a joint consensus statement by the American Society of Addiction Medicine, the American Academy of Pain Medicine and the American Pain Society (2001), and the CDC is as follows:

Pain. An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage.

Chronic pain. Pain lasting greater than 3 months and past the time of normal tissue healing.

Multimodal treatment. The concurrent use of separate therapeutic interventions with different mechanisms of action within one discipline aimed at different pain mechanisms (e.g., the use of pregabalin and opioids for pain control by a physician; the use of non-steroidal anti-inflammatory drugs [NSAIDs] and orthosis for pain control by a physician).

Long-term opioid use. Use of opioids on most days for more than 3 months.

Addiction. A primary, chronic, neurobiological disease, with genetic, psychosocial, and environmental

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The author has disclosed no conflicts of interest.

DOI: 10.1097/NOR.0000000000000526

factors influencing its development and manifestations. It is characterized by behaviors that include one or more of the following: impaired control over drug use, compulsive use, continued use despite harm, and craving.

Physical dependence. A state of adaptation that is manifested by a drug class-specific withdrawal syndrome that can be produced by abrupt cessation, rapid dose reduction, decreasing blood level of the drug, and/or administration of an antagonist.

Tolerance. A state of adaptation in which exposure to a drug induces changes that result in a diminution of one or more of the drug's effects over time.

Case Study

HISTORY

A 56-year-old man presents for L4-S1 transforaminal lumbar interbody fusion for degenerative spondylolisthesis. His medical history includes chronic low back pain, daily opioid use, and depression that is well controlled with sertraline. He works in a shipping warehouse for a furniture retailer. He reports approximately 15 years of chronic low back pain. He began taking opioid medications 10 years ago.

On the day of surgery, his home regimen includes a 25 mcg/hour of transdermal (TD) fentanyl patch in addition to taking oral oxycodone 5-mg tablets, four times a day. He does not have any history of opioid addiction. He did experience acute withdrawal symptoms when he forgot to replace his fentanyl patch a few weeks ago.

PLAN

First, the surgical and anesthesia teams identify that the patient is at risk for poorly controlled pain postoperatively, given his chronic, high-dose opioid use. A pain plan is established preoperatively and shared with the patient. This includes a discussion of his baseline tolerance to opioid medications and the accompanying challenges. This plan involves multimodal analgesia, intravenous (IV) opioid patient-controlled analgesia (PCA), and consultation of the acute pain service postoperatively if necessary.

In the preoperative holding unit, the patient receives oral acetaminophen and pregabalin. The anesthesiologist engages him in a detailed discussion about realistic expectations for pain control after the surgery and provides reassurance that treatment of his pain will be a priority for the care team. The anesthesiologist confirms the site of the TD fentanyl patch and routine dosing of sertraline for depression. Intraoperatively, pain treatment includes ketamine and sufentanil infusions. Small dexmedetomidine boluses are titrated as the surgeon is closing and on arrival to the post-anesthesia care unit (PACU). Local anesthetic is infiltrated around the incision at time of closure. In the PACU the RN administers several doses of IV hydromorphone; however, his pain remains poorly controlled. A hydromorphone IV PCA is initiated.

On arrival to the orthopaedic floor, the inpatient nurse quickly establishes rapport, reviews the plan for postoperative pain care, and confirms reasonable

expectations regarding pain. The patient is placed on continuous pulse oximetry and the nurse performs frequent assessments of pain, level of sedation, and respiratory status. He continues to use the hydromorphone PCA overnight with adequate pain control.

The acute pain service is consulted to help transition the patient back to oral medications on postoperative day 1. Based on his total IV PCA use in the preceding 24 hours, they recommend continuing his TD fentanyl at his home level of 25 mcg/hour and transitioning to oral oxycodone 15 mg as needed four times a day. This oxycodone dose is three times his usual home dose. Acetaminophen is scheduled every 6 hours. On postoperative day 3, he is stable on his oral opioid dosing and ready for discharge. The RN and the physician team both review a clear plan for weaning his oxycodone down to preoperative levels over the next 2 weeks. He is counseled to take his opioid medications only as directed. A follow-up appointment is planned for a week after discharge to ensure he is successfully tapering.

Current Trends in Postoperative Pain Management

Review of the literature reveals that fewer than half of patients undergoing surgery report adequate postoperative pain relief. Approximately 80% of patients report acute postoperative pain and 75% of those patients rate their pain as being moderate, severe, or extreme (Chou et al., 2016). Surgical patients with preexisting chronic pain and long-term opioid use are likely more at risk for poorly managed postoperative pain, longer length of hospitalization, and need for specialized pain management services. An observational study compared 30 chronic pain patients using opioids with 25 patients managed without opioids. The opioid group had a much higher level of initial pain after surgery. Both chronic pain groups exhibited a much slower resolution of pain following surgery when compared with patients without chronic pain (Chapman, Davis, Donaldson, Naylor, & Winchester, 2011).

These trends are significant given that inadequate postoperative pain control has many adverse effects. Normal respiratory and gastrointestinal functions are slower to return to normal. A heightened physiologic stress response results from poorly controlled pain. This delays healing and increases risk for the development of additional chronic pain (Rajpal et al., 2010). Therefore, there should be strategies in place to better care for these multifaceted patients.

Challenges of the Chronic Pain Population

There are several central challenges to acknowledge in surgical patients with chronic pain on long-term opioid therapy. These challenges contribute to the burden of postoperative pain as well as the slower trajectory of pain resolution. Recognizing the following complications may help providers to fully implement a comprehensive plan when treating these patients.

PHYSICAL DEPENDENCE OR TOLERANCE TO OPIOIDS

Most patients with prolonged opioid use have developed physical dependence and sometimes tolerance as defined previously. Complex changes at the cellular and synaptic level are implicated. Tolerance involves many alterations involving the opioid receptors including desensitization, internalization, and downregulation. Dependence and withdrawal symptoms are related to opioid receptor counteradaptation. Counteradaptation is defined as changes in receptor signaling pathways, specifically neurotransmitter release, that occur in response to frequent exposure to opioid medications. For example, alterations in neurotransmitter release are known to impact descending pain modulation in the midbrain.

COMORBID AFFECTIVE DISORDERS

Depression and anxiety are prevalent among chronic pain patients. One study found that depression and anxiety symptoms predicted both level of pain and pain-related disability. Over half of chronic pain patients in that study reported a burden of both depression and anxiety symptoms (Lerman, Rudich, Brill, Shalev, & Shahar, 2015). Patients prescribed opioids for chronic pain have more affective disorders and substance abuse when compared with patients not using opioids for chronic pain (Hilliard et al., 2018). Affective disorders, most specifically anxiety, present unique obstacles for controlling postoperative pain and should be assessed.

ELEVATED RISK OF COMPLICATIONS AND PAIN

A review of the literature demonstrates higher complication rates and postoperative pain in patients taking chronic opioids prior to surgery. Generally, preexisting chronic pain predisposes a patient to a slower rate of pain resolution after surgery. This trajectory of pain resolution is much slower in patients who chronically use opioids (Chapman et al., 2011).

One study compared outcomes in 49 total knee arthroplasty (TKA) patients with either preoperative chronic opioid use or nonuse. Those with chronic opioid use had a significantly higher rate of complications. Complications included revision or repeat arthroscopic evaluation, prolonged pain, and recovery and referral for specialized pain management services (Zywiell, Stroh, Lee, Bonutti, & Mont, 2011). Another prospective cohort study of TKA patients examined pain 6 months after surgery. Preoperative opioid users achieved significantly less pain relief from the knee surgery (Smith et al., 2017). Furthermore, an extensive database review including 324,154 patients 1 year after TKA or total hip arthroplasty found a similar trend. Opioid-naïve patients in the review demonstrated lower 30-day readmission rates and were less likely to need an early surgical revision (Weick, Bawa, Dirschl, & Luu, 2018).

Overall, total postoperative opioid burden is also impactful. Another examination of population-based data investigated how outcomes in orthopaedic surgery specifically are affected by levels of postoperative opioid use. Higher opioid prescription levels postoperatively were correlated to higher length of stay, cost, and complication rates, specifically infections, thromboembolic, and gastrointestinal complications (Cozowicz et al., 2017).

Application for Practice and Treatment Strategies

These challenges of opioid tolerance or dependence, comorbid affective disorders, and higher postoperative pain burden and complications may be addressed with specific strategies when managing these patients. In 2016, the American Pain Society and the American Society of Anesthesiologists published *Guidelines on the Management of Postoperative Pain*.

Implementing many of these recommendations is especially critical in patients with chronic pain and long-term opioid use. There are multiple meaningful tools for orthopaedic nurses and advance practice nurses to implement in their practice.

REVIEW HISTORY AND ESTABLISH RELATIONSHIP

First, based on a review of the medical record and the patient's home medications, providers can identify at-risk patients. Second, a thorough preoperative evaluation including a history of chronic pain, medical and psychiatric comorbidities, substance abuse, and previous pain treatment regimens and responses should be performed (Chou et al., 2016). There should be both a pre- and a postoperative discussion with the patient about goals for pain control as well as realistic expectations. Providing preparatory information about expected level of discomfort may be helpful (Gorczyca, 2013). Both the physician and the nurse should contribute to this discussion.

Postoperatively, the orthopaedic nurse may play a primary role in pain care by establishing a trusting relationship with the patient (e.g., by reassuring patients of their confidentiality and nonbias pertaining to their chronic opioid use). Patients should be assured that controlling their pain will be a priority. However, the nurse should also reinforce the realistic expectations that were established preoperatively. In addition, safety, specifically avoiding oversedation or respiratory depression, will hold the same level of priority as achieving optimal pain management. Opioid tolerance may be an obstacle in treating their pain; however, reassurance that the care team will implement all available multimodal strategies should be emphasized (Taylor & Stanbury, 2009).

Overall, there should be education tailored to the individual patients regarding the plan and goals for their pain management as they arrive in the PACU or orthopaedic floor. This plan remains fluid during their stay and the pain treatment plan may be adjusted based on how adequate their pain relief is or any adverse effects that arise (Chou et al., 2016; Mehta & Langford, 2006).

ASSESS, TREAT, AND REASSESS

Next, a validated pain assessment tool should be utilized to track responses to treatment and to adjust treatment. The 2016 *Guidelines on the Management of Postoperative Pain* includes a complete list of the validated pain intensity assessment scales. In general, they include specific Numeric Rating Scales and verbal rating scales as well as visual analog scales, Pain Thermometer and Faces Rating Scales (Chou et al., 2016). In most patients two or more scales may be used to more accurately characterize and track their pain.

Opioid Dosing

To avoid symptoms of withdrawal and adequately manage acute-on-chronic pain, equianalgesic dosing of baseline opioids should be continued. Specifically, long-acting opioids should be maintained at the same dose and scheduling. This includes oral extended-release opioids, transdermal fentanyl, and implanted intrathecal pump infusions. The short-acting or immediate-release opioid dose should be increased or maintained based on postoperative pain assessment and after considering other multimodal adjuncts being administered.

If the patient is unable to tolerate oral medications due to aspiration risk or ileus, the IV equivalent to the oral opioid dose should be provided. An IV PCA method may be employed if IV dosing is necessary for more than a few hours and the patient has the cognitive capacity to understand the delivery device. PCA dosing is preferred over nurse-initiated intermittent bolus of opioids (Chou et al., 2016). Hydromorphone is most commonly used for postoperative PCA dosing; however, there is currently a nationwide shortage of hydromorphone. Morphine may be considered as a substitution.

Continuous pulse oximetry should be employed while on the orthopaedic floor, as opioid dosing is escalated above baseline home doses. Care providers should also monitor sedation and signs of hypoventilation or hypoxia. Pulse oximetry alone has a low sensitivity for detecting hypoventilation, especially when supplemental oxygen is being administered. Nurse observation of mental status changes and respiratory rate may be just as important in preventing adverse outcomes from opioids. If a patient is overly sedated or shows signs of hypoventilation, the opioid dosing should be decreased. Opioid antagonists should be readily available (Chou et al., 2016).

Multimodal Analgesics

Evidence supports that multimodal analgesia, or use of analgesics with various mechanisms of action, provides not only better pain control but also improved recovery, reduction in morbidity, and lower costs (Rajpal et al., 2010; Wu & Raja, 2001). For example, a review of 22 randomized controlled trials involving a preoperative dose of oral gabapentin revealed a reduction of postoperative pain, opioid consumption, and related adverse effects (Rajpal et al., 2010). A quality improvement study comparing 100 postoperative patients using an IV opioid PCA versus 100 patients receiving oral multimodal therapy reached similar conclusions. They found that the oral multimodal group required significantly less opioid to control their pain. In addition, they reported fewer side effects, less functional issues, and heightened patient satisfaction in comparison to the PCA group (Rajpal et al., 2010). Applying multimodal therapies to augment existing opioid use is especially critical. Scheduled NSAIDs, acetaminophen, gabapentin, or pregabalin and ketamine infusions may all help depending on the nature of the pain (Buvanendran & Kroin, 2009).

Pain Consult

There are several postoperative situations that warrant a consult to a pain medicine physician or acute pain service. This may not be available at all institutions. First,

if the established pain plan fails to provide adequate pain relief and the primary team is unsure of how to best proceed, consider a pain consult. Or, if the primary provider is uncomfortable escalating to higher doses of opioid medications, a consult is also warranted. Depending on institution-specific guidelines, an acute pain service may need to be involved in continuous dosing of medications such as ketamine or dexmedetomidine in the postoperative period.

Alternative Therapies

In addition, nonpharmacologic interventions should also be considered. Use of transcutaneous electrical nerve stimulation has been validated in the postoperative period. Its success is dependent on the location and etiology of the pain. The American Pain Society guidelines found insufficient evidence to recommend acupuncture, massage, or cold therapy as adjunct pain treatments; however, their use is also not discouraged (Chou et al., 2016). Certainly, thermal modalities as well as manual therapies to help with pain relief may be successful in some patients (Mehta & Langford, 2006). If hospital resources provide massage or acupuncture, this may allow for simple distraction and therefore pain relief.

SUPPORT AND TREAT AFFECTIVE SYMPTOMS

Psychological interventions also play a central role in pain control for long-term opioid patients. Patients with preexisting anxiety and depression should continue their established pharmacotherapy. Pharmacological adjuncts should be considered, especially for treating symptoms of anxiety that may negatively impact pain control (Wu & Raja, 2001). Nurses may be most likely to note escalating symptoms of anxiety and recommend additional treatment.

Cognitive-behavioral therapies may be implemented to supplement pharmacotherapy. These modalities have been shown to have positive effects on pain, anxiety, and analgesic use (Chou et al., 2016). Nurses may be central in ensuring these therapies are performed. Strategies include guided imagery and other guided relaxation techniques. Music may be used as a part of guided relaxation or as a specific intervention. Hypnosis is another technique that requires specific training. Intraoperative suggestions or positive affirmations while the patient is under general anesthesia have also been used with positive outcomes (Chou et al., 2016). Even providing basic reassurance to the patient and consistent empathy may ease some of the anxiety burden. Nurses may help patients with distraction or attention diversion; however, these methods are less supported in the literature (Gorczyca, Filip & Walczak, 2013). An inpatient or outpatient referral for psychiatric assessment should be considered if symptoms are not well controlled.

EDUCATE AT DISCHARGE

Finally, patients should be educated about the pain treatment plan to follow after discharge from the hospital, specifically tapering of pain medications to an appropriate maintenance dose (Box 1). Counseling at the time of discharge offers important tools for the patient.

Box 1. GOALS IN POSTOPERATIVE MANAGEMENT OF CHRONIC PAIN PATIENTS

1. Identifying at-risk patients
2. Establish trust and confidence; discuss pain treatment plan
3. Comprehensive postoperative assessment of pain and ongoing reassessment
4. Maintain equi-analgesic dosing of baseline opioids to prevent withdrawal and best manage pain
 - a. Continue long-acting opioid prescription, intrathecal pump infusion, or transdermal fentanyl
 - b. Consider increasing short-acting opioid dose appropriately
5. Apply additional analgesic treatments for acute pain
 - a. Multimodal therapy to augment opioids: NSAIDs, acetaminophen, ketamine, gabapentin/pregabalin, regional anesthesia
 - b. Alternative therapies: massage, acupuncture, heat/cold applications, TENS unit
 - c. Consult acute pain service team as needed and if available
6. Treat comorbid symptoms of psychological affective disorders
 - a. Anxiolysis with medication
 - b. Cognitive strategies
 - c. Recommend psychiatric referral or consult
7. Define and implement appropriate maintenance opioid therapy for discharge

Note. NSAIDs = nonsteroidal anti-inflammatory drugs; TENS = transcutaneous electrical nerve stimulation.

Nurses can review the plan for tapering medications, how to take medications safely, and how to manage possible side effects. They may also review signs and symptoms of overdose with family members and the patient (Chou et al., 2016).

Conclusion

In summary, many patients presenting for surgery, especially orthopaedic surgery, carry a preexisting diagnosis of chronic pain and many also use long-term opioid therapy. Chronic pain patients present unique challenges for achieving postoperative pain control. Tolerance to opioid medications, coexisting depression, and anxiety and higher levels of postoperative pain all add to the difficulty of adequately treating pain in this population. Understanding these specific complexities should allow for more comprehensive care. Applying a care plan that addresses patient trust and expectations, maintenance and escalation of opioid therapy, adjunct analgesics, alternative pain treatments, anxiolysis strategies, and education at time of discharge may help better care for these multifaceted patients.

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