

# Postoperative Pain Control



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## KEYWORDS

- Postoperative pain • Multimodal analgesia • Opioids • Nerve blocks
- Local anesthetics

## KEY POINTS

- Inadequate treatment of postoperative pain may lead to worse outcomes and persistent postoperative pain.
- A multimodal approach to pain management (including preemptive and preventative analgesia) lessens the dependence on any given medication and improves outcome.
- Local anesthetics can be administered via multiple routes (eg, wound infiltration, epidural, peripheral nerve blocks) to improve analgesia and decrease opioid requirements and opioid-related side effects.
- Despite multiple adverse effects, opioids remain the mainstay of surgical pain control.

## INTRODUCTION

Pain is defined by the International Association for the Study of Pain as “an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage.”<sup>1</sup> Effective control and management of postoperative pain are clearly of primary concern to the patient and also of importance to the surgeon, because of potential adverse effects of the physiologic response to pain from surgery. Inadequate treatment of postoperative pain continues to be an important clinical problem, not only leading to worse outcomes in the immediate postoperative period but also an increased risk for persistent postoperative pain. Persistent postsurgical pain, pain that lasts beyond the typical healing period of 1 to 2 months, has become increasingly recognized as a significant issue after surgery and may exceed 30% after some operations, particularly amputations, thoracotomy, mastectomy, and inguinal hernia repairs.<sup>2</sup>

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Inadequate pain relief occurs secondary to multiple factors, including insufficient knowledge of the care providers, fear of medication side effects, and inadequate patient preparation. Optimal management of postoperative pain requires an understanding of the pathophysiology of pain, methods used for assessment of pain in individual patients, and awareness of the various options available for pain control. Key factors to consider are type of surgical procedure, skills of the surgeon and anesthesiologist, concerns of the patient, and the experience and cooperation of nursing and other health care providers. Based on this foundation of understanding, use of a procedure-specific, multimodal perioperative pain management provides a rational basis for enhanced postoperative recovery and reduction of morbidity.<sup>3-5</sup>

## **PATHOPHYSIOLOGY OF POSTOPERATIVE PAIN**

Acute postoperative pain is a normal response to surgical intervention and is a cause of delayed recovery and discharge after surgery as well as increased risk of wound infection and respiratory/cardiovascular complications.<sup>6</sup> Untreated acute pain leads to reduced patient satisfaction and increased morbidity and mortality and also places a burden on the patient and health system finances. Acute pain that becomes intractable and persists is referred to as chronic postsurgical pain (CPSP). CPSP can have a significant impact on the patient's quality of life and daily activities, including disturbances of sleep and affective mood.<sup>2,6</sup> Pain lasting more than 1 month after surgery occurs in 10% to 50% of individuals after common procedures, and 2% to 10% of these patients continue on to experience severe chronic pain.<sup>7</sup> Risk factors for the development of CPSP are outlined in **Box 1**.

Acute postsurgical pain occurs secondary to inflammation from tissue trauma or direct nerve injury and can be classified as nociceptive or neuropathic (**Table 1**). Tissue trauma releases local inflammatory mediators, which can produce hyperalgesia (increased sensitivity to stimuli in the area surrounding an injury) or allodynia (misperception of pain to nonnoxious stimuli). Other mechanisms contributing to hyperalgesia and allodynia include sensitization of the peripheral pain receptors (primary hyperalgesia) and increased excitability of central nervous system neurons (secondary hyperalgesia).<sup>8</sup>

It is increasingly recognized that genetic factors should be considered within the context of the interacting physiologic, psychological, and environmental factors that influence responses to pain and analgesia.<sup>1</sup> Genetic factors regulating opioid pharmacokinetics (metabolizing enzymes, transporters) and pharmacodynamics (receptors and signal transduction elements) contribute to a large interpatient variability in postoperative opioid requirements. Specific examples include genetic polymorphisms, which affect plasma concentrations of active metabolites of codeine and tramadol as well as plasma concentrations of methadone.<sup>1</sup>

Pain control has traditionally used opioid analgesia to target central mechanisms involved in the perception of pain. A multimodal approach recognizing the pathophysiology of surgical pain uses several agents to decrease pain receptor activity and diminish the local hormonal response to injury.<sup>8,9</sup> This approach lessens the dependence on a given medication and mechanism. For example, local anesthetics can directly block pain receptor activity, antiinflammatory agents can decrease the hormonal response to injury, and drugs such as acetaminophen, ketamine, clonidine, dexmedetomidine, gabapentin, and pregabalin can produce analgesia by targeting specific neurotransmitters.<sup>8</sup> Nonopioid agents used for management of postoperative pain are outlined in **Table 2**.

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