The Efficacy of Preemptive Analgesia for Postoperative Pain Control: A Systematic Review of the Literature

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ABSTRACT

The purpose of preemptive analgesia is to reduce postoperative pain, contributing to a more comfortable recovery period and reducing the need for narcotic pain control. The efficacy of preemptive analgesia remains controversial. This systematic review of the literature evaluated the efficacy of nonsteroidal anti-inflammatory drugs (NSAIDs), cyclooxygenase-2 (COX-2) inhibitors, and gabapentin as preemptive oral analgesics for surgical patients. Included articles were limited to studies of adult patients that compared the difference in postoperative pain between control and treatment groups. Of 40 studies reviewed, 14 met the inclusion criteria, including two on NSAIDs, four on COX-2 inhibitors, and eight on gabapentin. Research was predominantly conducted outside the United States. Gabapentin and COX-2 inhibitors were found to be the most effective preemptive analgesics for postoperative pain control. As part of a collaborative team, perioperative nurses and certified RN anesthetists are responsible for ongoing pain assessment and management for preemptive analgesic interventions. *AORN J* 101 (January 2015) 94-105. © AORN, Inc, 2015. http://dx.doi.org/10.1016/j.aorn.2014.01.030

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Recent studies have shown that acute postoperative pain continues to be undermanaged even as surgery and anesthesia become safer.[1] Effective postoperative pain management increases patient satisfaction, improves patient outcomes, and reduces the cost of care.[2] Therefore, there has been an increasing emphasis on improving postoperative pain control. As focus is increasingly directed toward controlling pain and reducing narcotic use, preemptive analgesia may become more prevalent. A number of clinical trials have suggested that preemptive analgesia leads to a decrease in postoperative pain, less total analgesic consumption, and improved patient comfort.[3] It is

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important that perioperative nurses understand the use of preemptive analgesia so they can evaluate outcomes of treatment, especially as related to postoperative pain control.

According to the International Association for the Study of Pain, pain is an unpleasant sensation associated with sensory and emotional experiences that can cause potential or actual tissue damage.[4] Acute postoperative pain typically is caused by mechanical, chemical, and thermal nociceptive stimuli (ie, painful, sometimes detrimental or injurious, stimuli). Acute nociceptive signals associated with tissue damage initiate alterations in the peripheral and central pain pathways. Primary afferent neurons detect noxious stimuli from the periphery and through transduction conduct pain signals to the dorsal horn of the central nervous system (CNS). An inflammatory response occurs with tissue damage and leads to the release of chemical mediators such as substance P, histamine, bradykinin, and prostaglandin. This leads to peripheral sensitization caused by increased conduction of nociceptive stimuli to the CNS. Central sensitization occurs as a result of amplification of nociceptive neurons in the dorsal horn of the CNS.[5] In addition, severe acute pain is a risk factor for the development of chronic pain.

Preemptive analgesia is an antinociceptive treatment applied before tissue injury to prevent peripheral and central sensitization.[6] By decreasing sensitization, preemptive analgesia is thought to decrease the incidence of postoperative hyperalgesia and allodynia.[3] Decreasing sensitization is thought to reduce the magnitude and duration of postoperative pain. The concept of preemptive analgesia for postoperative pain control was pioneered in 1913 by George W. Crile, MD, who based his assumptions on clinical observations that suggested that analgesic interventions were more effective when they were administered before a surgical procedure.[7] Subsequent experimental evidence suggested that it may be possible to decrease or prevent the neurophysiological and biochemical effects of noxious input to the CNS—such as surgery—rather than initiating treatment after a noxious event occurs.[5]

The efficacy of preemptive analgesia remains controversial in the United States because the majority of studies have been conducted in other countries and multiple medications and modes of delivery have been used; in addition, results from trials in humans have been inconsistent. Preemptive analgesia has been researched widely in oral surgical procedures, especially in countries other than the United States, and is becoming popular in a variety of surgical procedures, including laparoscopic cholecystectomy, coronary artery bypass surgery, thyroidectomy, lumbar discectomy, and joint replacements.[8-11] If the research shows that preemptive analgesia is used successfully to relieve postoperative pain in other countries, it would be important for health care practitioners in the United States to consider its use.

Although animal studies have shown positive benefits from preemptive analgesia, clinical trials in humans remain inconsistent regarding efficacy, as well as medication use.[3] This inconsistency may be caused by many factors, such as a lack of uniformity in defining preemptive analgesia, variation in methodology used for clinical trials, timing of the prestimulus versus poststimulus dose, and lack of an objective standard for pain measurement.[2] Researchers are just beginning to study what types of medications are most beneficial for use; thus, the optimal medication treatment choices have not been clearly established by the literature.

Preemptive analgesia began to be used more frequently at our hospital when new anesthesiologists joined the staff. This practice resulted in controversy between anesthesia providers regarding whether preemptive analgesia is effective. Thus, we conducted a systematic review of the literature, focusing specifically on the preemptive analgesia being used at our clinical site. Clinical trials on preemptive analgesia have evaluated different analgesics using a variety of administration routes. The majority of clinical studies and reviews for preemptive analgesia focus on an individual