

Opioid Use After Upper Extremity Surgery

Erich M. Gauger, MD,* Erica J. Gauger, MD,† Mihir J. Desai, MD,* Donald H. Lee, MD*

Ever since the institution of pain as the fifth vital sign, there has been a rising opioid epidemic in the United States, with Americans now consuming 80% of the global opioid supply while representing only 5% of the world's population. Surgeons are tasked with the duty of both managing patients' pain in the perioperative period and following responsible prescribing behaviors. Several articles have been published with the goal of evaluating opioid use after upper extremity surgery, risk factors for opioid misuse/abuse, the impact of anesthetic type, and the role of multimodal pain management regimens. These studies have found that, on average, surgeons prescribe 2 to 5 times more opioids than patients consume. Multimodal pain management strategies are effective for decreasing postoperative opioid consumption. Risk factors for prolonged opioid use and/or misuse are younger age, history of substance abuse, psychological disorders, and previous pain diagnoses. Use of regional blockade anesthesia, particularly with long-acting agents or indwelling catheters, can be helpful in the management of postoperative pain. This review article summarizes the available literature regarding opioid use after upper extremity surgery to provide the surgeon with additional information to make informed decisions regarding postoperative opioid prescription. (*J Hand Surg Am.* 2018; ■(■): ■–■. Copyright © 2018 by the American Society for Surgery of the Hand. All rights reserved.)

Key words Opioid, opioid abuse, narcotics, upper extremity.

THE OPIOID EPIDEMIC

The United States is in the midst of an expanding opioid epidemic, the scope of which is currently being elucidated. The death rate in the United States secondary to the misuse/abuse of opioid analgesics doubled from 1999 to 2013.¹ In 2010, 5.1 million Americans aged 12 or older had used opioid medications for nonmedical reasons within the past month, correlating with a 153% increase in emergency department visits from 2004 to 2011 attributed to the misuse/abuse of opioid analgesics.² In addition, an estimated \$42 billion of lost

economic productivity is linked to nonmedical prescription opioid use.² The extent of the problem is unique to the United States, with Americans consuming 80% of the global opioid supply while representing only 5% of the world's population.³

The origin of the opioid epidemic can be traced back to the 1990s, when an increased focus on perioperative pain management resulted in the identification of pain as the fifth vital sign.⁴ Publications during that time highlighted the undertreatment of pain and promoted opioid medications as safe for primary pain treatment, all while minimizing their side effects and addictive properties.¹ By 2001, the Joint Commission on Accreditation of Healthcare Organizations published Pain Management Standards linking hospital accreditation to the establishment of an organized program to assess and treat perioperative pain.⁴ In 1998, the Federation of State Medical Boards reassured physicians that large doses of opioids could be prescribed for the treatment of pain, and in 2004 was asked to punish physicians for the undertreatment of pain.^{2,4} The required assessment and treatment of pain as part of hospital accreditation,

From the *Vanderbilt Department of Orthopaedics, Vanderbilt University Medical Center, Nashville, TN; and †TRIA Orthopaedic Center, Woodbury, MN.

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Corresponding author: Donald H. Lee, MD, Vanderbilt Department of Orthopaedics, Vanderbilt University Medical Center, 1215 21st Avenue South, Ste. 3200, Nashville, TN 37232 8828; e-mail: donald.h.lee@vanderbilt.edu.

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emphasis on adequate pain control for satisfactory patient outcomes combined with the purported benefits, and safety of opioid medications have resulted in the current opioid epidemic.

Upper extremity surgery has been well established as a strong source of pain, directly affecting patient satisfaction. A delicate balance exists between managing a patient's postoperative pain and preventing opioid side effects, abuse/misuse, dependence, or diversion. The goal of this review article is to identify all primary clinical studies focused on opioid use after upper extremity surgery at or distal to the elbow to determine: (1) if any recommendations can be made for the amount of opioids that should be prescribed after upper extremity procedures, (2) risk factors associated with prolonged opioid use after surgery, and (3) the surgeon's role in combating the opioid epidemic.

CLINICAL STUDIES

Over the last several years, there has been a substantial increase in clinical research focused on postoperative opioid utilization. A literature search was completed to find all English language primary clinical articles or abstracts that involved quantification of opioid consumption as a primary or secondary outcome. Articles were excluded if the primary opioid studied was tramadol. The search resulted in 16 studies^{3,5-19} (Table 1) that can be divided into 4 categories based on the primary purpose or outcome measure: (1) comparison of anesthesia type with opioid consumption, (2) determining opioid prescription and/or consumption patterns, (3) identification of risk factors associated with prolonged opioid use, and (4) assessing the effectiveness of a multimodal pain program. The categories are derivative of the factors associated with the opioid epidemic including the aggressive culture of pain management, lack of prescribing guidelines for physicians, and inconsistent perioperative utilization of local anesthetics.³

ANESTHESIA

Although still preferred in certain circumstances, general anesthesia has been largely abandoned for monitored anesthesia care or wide awake hand surgery. Regional nerve blocks or local infiltration with anesthetic has the benefit of providing intraoperative and postoperative pain relief and has been hypothesized as a factor to decrease postoperative opioid consumption. An early Level I randomized control trial from Ilfeld et al⁸ showed that a continuous

infraclavicular perineural catheter significantly reduced pain, opioid consumption, and opioid-related side effects compared with a saline control. Catheter site infection, nerve injury, and catheter migration are potential risks with continuous infusion. Single injection nerve blocks negate several potential complications as well as the patient responsibility for monitoring an infusion pump, but lack the analgesic duration of a continuous infusion. Forearm nerve blocks have the benefit of fewer motor symptoms than brachial plexus blockade, but have not been shown to alter postoperative opioid utilization.¹⁶ There is also no reduction in opioid consumption with periarticular injection for distal radius fracture fixation.⁶ Exparel is an appealing alternative to a continuous infusion pump due to its long analgesic duration. Although there is no study that evaluates opioid consumption after single injection nerve blocks with Exparel compared with a continuous perineural infusion pump, studies have demonstrated lower opioid consumption in patients undergoing hand procedures with local Exparel injection.^{10,12} The specific surgical procedure is an important consideration when evaluating whether the type of anesthesia affects opioid consumption as patients undergoing general or regional anesthesia typically do so for more extensive surgeries, and therefore consume more opioids postoperatively.³

OPIOID PRESCRIPTION AND CONSUMPTION PATTERNS

Most orthopedic surgeons recognize the difficulty in knowing the appropriate number of pills to prescribe and/or how many pills patients actually take.¹ The Federation of State Medical Boards and other governing bodies do not offer concrete recommendations for the correct amount of opioid analgesics for specific surgical procedures.¹⁷ Furthermore, even if recommendations did exist, surgeons are hesitant to adhere to guidelines or protocols.¹⁷ Recent focus has been on understanding opioid prescribing and consumption patterns in the hopes of influencing safe prescribing practices and improving perioperative patient care. The recurrent finding is that physicians overprescribe opioid medications. Across all reports, 2 to 5 times more opioids are prescribed than consumed.^{3,5,13}

Rodgers et al¹⁵ determined that patients who underwent bone procedures reported the highest opioid use (14 pills), whereas patients who had isolated soft tissue surgery consumed an average of 9 pills. More than 50% of patients take opioids for 2 days or less

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