

Multimodal Analgesia in Foot and Ankle Surgery

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KEYWORDS

• Multimodal • Analgesia • Foot and ankle • Surgery • Orthopedics

KEY POINTS

- Recent advances in multimodal analgesia have allowed most foot and ankle surgery to be performed in ambulatory outpatient surgical centers.
- Multimodal analgesia focuses on improving postoperative pain while limiting adverse effects of individual agents, which allows less reliance on opioid pain medications and a decrease in their adverse effects.
- Numerous oral pain medications have been used in multimodal therapy, including nonsteroidal anti-inflammatory drugs (NSAIDs) and selective cyclooxygenase-2 (COX-2) inhibitors, acetaminophen or paracetamol, neuromodulatory medications (gabapentin and pregabalin), opioid agonists, glucocorticoids, and N-Methyl D-Aspartate (NMDA) antagonists.
- Local anesthesia techniques, including wound infiltration and intra-articular injections, provide excellent pain relief with very few adverse events.
- The combination of local anesthetic techniques or peripheral nerve blocks with supplementation using oral agents should be first-line analgesic therapy for patients undergoing outpatient foot and ankle procedures.

OVERVIEW

There has been a growing interest in alternative therapies for pain management following orthopedic procedures. In the past, opioid pain medications have been relied on as the treatment of choice for postoperative pain control. Recent progress in surgical and acute pain management strategies have allowed for most patients undergoing foot and ankle surgery to be performed on in ambulatory outpatient surgical centers. This article reviews multimodal analgesia options in the setting of perioperative foot and ankle surgery.

There are more than 90 million orthopedic procedures performed each year in the United States.¹ Of these procedures, 35 million are

performed in ambulatory centers.² Orthopedic patients report the highest incidence of pain compared with other types of surgical procedures, with greater than 50% of patients having suboptimal pain control.³ Postoperative pain is the most important concern among patients and is the most common reason for fear and avoidance of surgery.⁴

PERIOPERATIVE SURGICAL HOME

Pain management is a multifaceted system involving patients, physicians, hospitals, and health care organizations. The concept of a perioperative surgical home involves collaboration between the patient, the orthopedic surgeon, the anesthesiologist, and primary care or

Disclosure Statement: The authors did not receive grants or outside funding in support of their research for or preparation of this article. They did not receive payments or other benefits, or a commitment or agreement to provide such benefits from a commercial entity.

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Orthop Clin N Am ■ (2017) ■–■

<http://dx.doi.org/10.1016/j.jocl.2017.06.005>

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internal medicine provider. The perioperative surgical home provides a continuum of patient-focused perioperative care in the preoperative, intraoperative, and postoperative periods to allow for preoperative optimization, safe intraoperative care, and smooth transitions postoperatively through rehabilitation and back to primary care. The goal of this system is to improve outcomes following orthopedic surgery. Communication among these team members is essential to produce good perioperative outcomes and transitions after surgery. There are increased complications associated with increased postoperative pain.⁵ Prolonged hospitalization, increased readmission rate, higher costs, and slower recovery are associated with poorer postoperative pain control.^{3,6,7} Management of patient expectations for the preoperative, perioperative, and postoperative course in regard to rehabilitation and pain are key in improving outcomes following surgery. Multimodal analgesia is an important component in this pain management system.

OPIOID EPIDEMIC

Traditionally, opioid analgesics have been the cornerstone of postoperative analgesia following orthopedic surgery. Opioids as the sole source of analgesia are associated with significant side effects, and opioid-related adverse events occur more frequently with increased age, obesity, chronic obstructive pulmonary disease, obstructive sleep apnea, and hepatic and renal impairment.⁸ A retrospective review of a large national hospital database of 319,898 surgeries showed a 12.2% rate of opioid-related adverse events. Patients who experienced opioid-related adverse events had a higher adjusted mean cost of hospitalization, a greater length of stay, and were more likely to be readmitted.⁶ Hospitalizations and emergency department visits due to opioid abuse and misuse continue to increase. Between 2002 and 2012, hospitalization rates for opioid overuse among adults 18 years or older increased by greater than 60%.⁹ From 2006 to 2010, emergency department visits involving nonmedical use of opioids increased by 112%. Since 2003, opioid analgesics have been the cause of more deaths from overdose than cocaine and heroine combined.¹⁰ The increase in abuse, accidental death, and the high health care costs associated with opioid abuse has put an emphasis on alternative methods for perioperative pain control, as well as legislation aimed at restricting opioid prescriptions.

MULTIMODAL ANALGESIA

Recent gains in the area of multimodal analgesia have led to effective alternative methods of pain control. Multimodal analgesia focuses on improving postoperative pain while limiting adverse effects of individual agents. Combining pharmacologic and other modalities addresses multiple pain mechanisms while reducing adverse effects through the use of lower doses of individual modalities.¹¹ Multimodal therapy can shorten hospital stays, minimize use of narcotics, decrease pain scores, reduce opioid adverse effects, decrease times to reach rehabilitation milestones, and improve patient outcomes.^{12,13} Effective pain control requires combined drug synergy effects that block generation and perception of pain at several different stages in the pain pathway.¹⁴ Neuraxial and regional anesthesia block transmission of noxious stimuli in sensory neurons before it starts, and multimodal analgesia potentiates the effect of concomitant medications.¹³ The simultaneous use of 2 or more analgesics that act at different sites and receptor pathways within the central and peripheral nervous systems work to reduce pain and minimize opioid use (Fig. 1).^{14,15} Various oral medications have been used in multimodal therapy, including nonsteroidal anti-inflammatory drugs (NSAIDs) and cyclooxygenase (COX)-2 inhibitors, acetaminophen or paracetamol, neuromodulatory medications (gabapentin and pregabalin), opioid agonists, steroids, and N-methyl D-aspartate (NMDA) antagonists.

There is limited literature in foot and ankle surgery regarding the use of multimodal pain regimens. A multimodal pain protocol suggested by Michelson and colleagues¹⁶ seems to have favorable outcomes in patients undergoing ankle and hindfoot fusions. This multimodal pain protocol consisted of preoperative oral administration of extended-release oxycodone (10 mg), celecoxib (200 mg), pregabalin (75 mg), acetaminophen (1gm), and prednisone (40 mg). The postoperative pain regimen included oral extended-release oxycodone (10 mg every 12 hours), celecoxib (200 mg every 12 hours), and acetaminophen (1000 mg every 6 hours). Short-acting oxycodone (5–20 mg every 4 hours) was provided for breakthrough pain. Subjects were then discharged with prescriptions for 2 days of long-acting oxycodone, 2 weeks of celecoxib, and 2 weeks of short-acting oxycodone. The traditional protocol included no preoperative medications and the use of a patient-controlled analgesia-delivered

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