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Postoperative pain control after arthroscopic rotator cuff repair

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Arthroscopic rotator cuff repair (ARCR) can provide excellent clinical results for patients who fail to respond to conservative management of symptomatic rotator cuff tears. ARCR, however, can be associated with severe postoperative pain and discomfort that requires adequate analgesia. As ARCR continues to shift toward being performed as an outpatient procedure, it is incumbent on physicians and ambulatory surgical centers to provide appropriate pain relief with minimal side effects to ensure rapid recovery and safe discharge. Although intravenous and oral opioids are the cornerstone of pain management after orthopedic procedures, they are associated with drowsiness, nausea, vomiting, and increased length of hospital stay. As health care reimbursements continue to become more intimately focused on quality, patient satisfaction, and minimizing of complications, the need for adequate pain control with minimal complications will continue to be a principal focus for providers and institutions alike. We present a review of alternative modalities for pain relief after ARCR, including cryotherapy, intralesional anesthesia, nerve blockade, indwelling continuous nerve block catheters, and multimodal anesthesia. In choosing among these modalities, physicians should consider patient- and system-based factors to allow the efficient delivery of analgesia that optimizes recovery and improves patient satisfaction.

Level of evidence: Review Article

Keywords: Rotator cuff repair; arthroscopic; shoulder; postoperative pain; opioids, analgesia; brachial plexus; nerve block

In recent years, the number of arthroscopic rotator cuff repairs (ARCRs) being performed has increased significantly, with some authors reporting population-adjusted increases in procedural volume that range from 163% to 268%.[39,50] The increase in volume has been attributed to the aging population, increased activity level among patients, and significant advancements in arthroscopic techniques and fixation options available to surgeons.[28,39] In addition, there has been a significant shift toward ARCR's being performed at ambulatory surgery centers, where patients are traditionally discharged on the same day of surgery.[50] Despite being characterized as a "minimally invasive" procedure, ARCR is associated with significant postoperative pain in the acute perioperative period.[5,82] As the number of ARCRs being performed at ambulatory centers continues to increase, adequate analgesia associated with rapid recovery and minimal

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postoperative nausea and vomiting (PONV) is necessary to optimize patient outcomes and to reduce health care costs.

Traditionally, postoperative pain after ARCR has been managed with the use of oral opioid medications.[77] The significant pain associated with ARCR often requires large dosages that may have a variety of side effects, such as hypotension, PONV, and sedation, which may result in need for hospital admission and subsequent increased length of stay.[49,53,90] In an effort to minimize postoperative complications, to reduce duration of hospital stay, and ultimately to improve pain control in the acute perioperative period, several different modalities for pain control have been used after ARCR. The authors present a review of these various options, including opioid and nonopioid medications, cryotherapy, intralesional analgesia, suprascapular nerve blocks (SSNBs) with or without an axillary nerve block (ANB), interscalene brachial plexus blocks (IBPBs), and indwelling interscalene catheters.

Opioid analgesia

Opioid agents are widely considered the "gold standard" for postoperative analgesia after orthopedic surgery. Because of their adverse side effect profile and potential for abuse, however, there has been a significant effort to identify alternative methods for relieving postoperative pain, thus reducing risks associated with opioid use.[67,75] Common adverse effects associated with opioids include PONV, constipation, ileus, urinary retention, and pruritus.[77] More significant manifestations of side effects include hypoxia, respiratory depression, hypotension, somnolence, confusion, and dizziness.[49,81,82] As a result of these complications, opioid use after orthopedic procedures has been associated with increased length of hospital stay for a variety of orthopedic procedures.[7,45,90]

As the traditional model of an ambulatory surgery center is to provide surgical treatment and subsequent same-day discharge, postoperative use of intravenous (IV) patient-controlled analgesia (PCA) is a rarely used modality in this setting—although degree of PCA utilization may vary, depending on the insurance system and practice patterns present within specific countries and health care facilities. Patients who ultimately are unable to be discharged on the same day of surgery, however, may often receive a PCA during their hospital admission.

In situations in which a PCA is required, the literature supports its efficacy for postoperative pain management.[29] In addition, when PCA is used in adjunct with a background opioid infusion, patients report better analgesia and can tolerate increased narcotic consumption without a concomitant increase in nausea, vomiting, pruritus, or sedation.[102] Although providing a basal opioid infusion along with a PCA may result in an overall greater dose of opioid delivered, there is no evidence of increased respiratory depression in this setting.[26,91,102] In situations in which obtaining IV access may be difficult, a transdermal fentanyl patch may be used to effectively deliver postoperative opioids. Merivirta et al conducted a prospective, randomized controlled trial demonstrating that patients who used a postoperative fentanyl patch after arthroscopic shoulder surgery had equivalent postoperative pain relief to those who received a subacromial bupivacaine infusion, without demonstrating an increased incidence of respiratory complications.[72] In addition, patients who received a fentanyl patch required 50% less rescue doses of ibuprofen compared with those who received bupivacaine (600 mg vs. 1200 mg; $P = .042$).

Whereas IV PCA and transdermal patches are the most common methods of delivering opioid analgesia after ARCR, the addition of opioids through nerve blocks or intramuscular administration has also been reported. Behr et al reported on 150 patients undergoing ARCR and observed that compared with placebo controls, the duration of sensory block and postoperative analgesia was significantly longer in patients who had opioids either added to their interscalene block or delivered intramuscularly.[9] Candido et al echoed these results, reporting that the addition of opioids to brachial plexus blocks extended the duration of postoperative analgesia 3-fold compared with controls (17.4 ± 1.26 hours vs. 5.3 ± 0.15 hours; $P < .001$) for patients undergoing upper extremity surgery.[18] Although these methods could be highly useful in an inpatient setting, their utility in ambulatory surgery may be limited in considering that addition of opioids would likely delay discharge.

Opioids will likely continue to be an important component in the management of postoperative pain, and in situations that result in hospital admission, PCA or fentanyl patch in addition to oral opioids may be considered. The current paradigm shift and heightened awareness of the potential for opioid misuse, however, warrants a serious consideration of alternative methods of postoperative pain relief after ARCR.[75,76,113]

Nonopioid analgesia

Nonsteroidal anti-inflammatory drugs (NSAIDs) are a cornerstone in the nonoperative management of rotator cuff disease.[14,70] In the acute postoperative period, however, the use of these agents is not as widespread as other modalities. Although studies focusing on NSAIDs after ARCR are limited, NSAIDs can provide significant analgesia for patients in the acute postoperative phase, particularly when they are used as part of a multimodal protocol.[8,54] A level I study by Takada et al compared the analgesic effect of IV flurbiprofen, an NSAID medication, with placebo after ARCR. Results demonstrated statistically significant reductions in visual analog scale (VAS) pain scores at 6 hours, decreased opioid requirements during the first 2 hours postoperatively, and increased time to first request of analgesia in the NSAID group compared with controls.[107] Cyclooxygenase 2 (COX-2)–selective inhibitors are a subclass of traditional NSAIDS, most notable for their ability to reduce the incidence of gastric side effects.[24]