Pain Management Strategies in Shoulder Arthroplasty

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KEYWORDS

• Multimodal analgesia • Shoulder arthroplasty • Outpatient surgery • Pain control
• Open shoulder surgery • Opioid • Regional anesthesia

KEY POINTS

- Pain control in total shoulder arthroplasty demands a multidisciplinary approach with collaboration between the patients, surgeon, and anesthetist.
- A multimodal approach with preemptive medication, regional blockade, local anesthetics, and a combination of acetaminophen, nonsteroidal antiinflammatory drugs, tramadol, and gabapentinoids postoperatively leads to excellent pain control and patient satisfaction.
- Assessment of patients' expectations constitutes a vital aspect of the preoperative patient evaluation. Educating and psychologically preparing patients reduces postoperative pain.
- Patients with anxiety and depression, preoperative narcotic use, and medical comorbidities are at an increased risk for less effective pain control.
- Minimizing narcotic use decreases opioid-related adverse effects and facilitates productive rehabilitation efforts.

POSTOPERATIVE PAIN IN ORTHOPEDIC AND SHOULDER SURGERY

Shoulder arthroplasty has become a popular definitive treatment option for painful end-stage glenohumeral arthritis, and the demand for arthroplasty surgery is increasing.[1] Although shoulder arthroplasty provides durable long-term clinical results and lasting pain relief,[2–4] early postoperative pain is a major concern following orthopedic surgery and it is an unfavorable outcome causing distress to patients.[5,6] Shoulder surgery has the potential to cause significant postoperative pain, which often necessitates opioid medication.[7] Although opioids are effective in relieving postoperative pain at rest, 70% of patients reported severe pain on movement after open major shoulder and knee surgery.[6] Adequate control of pain is, therefore, critical to facilitate early rehabilitation. Opioid-only analgesic regimens for shoulder surgery are commonly associated with opioid-related adverse effects. These effects include nausea and vomiting, respiratory depression, somnolence, pruritus, sleep disturbances, urinary retention, constipation, and tolerance and may interfere with productive rehabilitation efforts postoperatively.[7–11]

Single analgesics alone are not able to provide adequate pain relief for most moderate or severe pain.[5,12] The dependence solely on opioid medication and the subsequent long-term adverse effects of inadequate pain control have been well described. These consequences include nociception-induced central sensitization and opioid-induced secondary hyperalgesia.

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Both of these mechanisms may be involved in the pathogenesis of persistent postsurgical pain.[7,13,14]

The Multimodal Approach

Recognizing the limitations of single analgesic pain regimens has led to the development of alternative strategies for analgesia. A combined approach, known as multimodal analgesia, achieves success by using the additive or synergistic effects between analgesics of different mechanisms and is currently recommended for effective postoperative pain control.[5,15] This approach results in a reduction of side effects from the resulting lower total doses of analgesics and differences in side effect profiles.[15]

The use of multimodal analgesia decreases pain scores and the requirement for postoperative analgesics in a variety of surgical procedures.[5] In one study, a multimodal analgesia clinical pathway evaluated for total shoulder arthroplasty provided excellent results and low pain scores, with half of the patients using little or no intravenous opiates.[16] Additionally, patients undergoing total hip or total knee arthroplasty using a comprehensive, preemptive, multimodal analgesia regimen emphasizing a peripheral nerve blockade have improved perioperative outcomes and fewer adverse events.[17]

The multimodal approach frequently incorporates regional blockade, local anesthetics, and a combination of acetaminophen, nonsteroidal antiinflammatory medications (NSAIDs), tramadol, and gabapentinoids postoperatively to reduce opioid consumption.[7] Regional blockade combats pain transmission through the central nervous system, whereas local anesthetics block sympathetic efferents and axon reflex to decrease pain transmission from tissue.[18] NSAIDs reduce prostaglandin synthesis and inhibit the initiation of pain signals through peripheral blockade of cyclooxygenase (COX) pathways.[19–21] Opioids act on specific opioid receptors in the central nervous system to attenuate pain-related signals,[20] whereas gabapentinoids are lipophilic gamma-aminobutyric acid (GABA) analogues shown to be effective in neuropathic pain, incisional injury, and inflammatory injury.[22]

Medication given before the start of a procedure is known as preemptive analgesia. Preemptive analgesia seeks to prevent hypersensitivity by blocking sensory inputs that induce central sensitization caused by inflammatory injury.[23] Acetaminophen, NSAIDs, and gabapentinoids given to patients in the immediate preoperative period has been investigated.[24–27] These studies have demonstrated reduced postoperative pain and reduced opioid consumption when given preoperatively.

PREOPERATIVE PATIENT CONSIDERATIONS

Patient Expectations

Optimal postoperative analgesia includes an evaluation of patients' postoperative expectations. Patients undergoing a variety of shoulder procedures have multiple expectations of surgery that vary by diagnosis, age, demographic characteristics, and functional status.[28,29] Outcome expectation plays a significant role in symptom improvement for a variety of shoulder-related complaints, and higher outcome expectations are associated with greater perceived improvements in shoulder function.[30] In a systematic review of 16 moderate-quality evidence articles analyzing the relation between expectations and outcomes, 15 showed positive expectations were associated with better health outcomes.[31] In patients undergoing rotator cuff repair, patients' preoperative expectations were associated with actual self-assessed outcome.[32] Expectations were a significant independent predictor of better outcome scores.

Preoperative educational classes can modify patients' preoperative expectations of their recovery from arthroplasty.[33] Furthermore, psychological preparation for patients has been shown to reduce the need for postoperative analgesics.[34] Carefully presented information from surgeons, anesthetists, and nurses about the procedure, anticipated sensory experiences, analgesic treatment, and recovery period is expected to reduce anxiety.

Anxiety and Depression

Studies investigating depression and anxiety show that preoperative psychological status may negatively influence postoperative outcome and is an essential part of the preoperative assessment.[35] Depression is present in 12.4% of patients undergoing total shoulder arthroplasty; it is twice as common in women, more prevalent in the low-income and Medicaid population, and often underdiagnosed.[36] Postoperative symptoms of distress and depression are associated with worse perceived improvement of pain.[37] As the perception of pain increases, greater opioid analgesic requirements can contribute to postoperative delirium; therefore, depression has been identified as an independent risk factor for postoperative delirium.[36] Depressive symptoms strongly influence perceived disability due to