Management of Acute Surgical Pain in Plastic and Reconstructive Surgery

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Summary: Fewer than half of all patients undergoing surgery report adequate postoperative pain relief. Poorly managed postoperative pain can lead to complications, increased hospital stays, prolonged rehabilitation, and a decreased quality of life. Pain rating scales are commonly used to identify, manage, and track the perceived intensity of pain. Changes in perceived pain severity and intensity are a key indicator for course of treatment. Postoperative pain is best treated with multimodal management with a variety of analgesic medications and techniques that target different receptors and mechanisms of action in the peripheral and central nervous systems. This includes systemic analgesia, regional analgesia, local analgesia (eg, topical and tumescent analgesia), and nonpharmacologic modalities. It is recommended that this approach is individually tailored and discussed through a shared decision-making approach. This review provides an overview of multimodal management for acute postoperative pain related to plastic surgery procedures. To increase patient satisfaction and provide effective pain control, it is recommended to educate patients on expectations of pain, multimodal options for pain control (including peripheral nerve blocks), complications of unrelieved pain, tracking and monitoring of pain by self-reporting, and how to reduce the use of opioid-based pain medication. *(Plast. Reconstr. Surg.* 153: 838e, 2024.)

The definition of pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage," by the subcommittee on taxonomy, was adopted by the International Association for the Study of Pain Council in 1979.[1] The effective relief of pain in a surgical patient after a procedure is of great importance. Poorly managed postoperative pain can lead to complications, prolonged rehabilitation, and a decreased quality of life.[2,3] Eighty percent of patients who undergo surgery in the United States report postoperative pain, with 88% of these patients reporting moderate, severe, or extreme pain levels.[4] Uncontrolled postsurgical pain has been linked to the development of persistent postsurgical pain caused by maladaptive neuronal plasticity.[5,6] The use of both opioid and nonopioid medications as part of postoperative pain treatment has increased significantly over the past decades.[7,8] Appropriate pain relief leads to shortened hospital stays, reduced hospital costs, and increased patient satisfaction.[2,3]

The incidence of pain and its levels vary by analgesic technique.[9] Predictive factors of the severity of acute postoperative pain include younger age, female sex, preoperative pain, anxiety and mood, and incision size.[10] This emphasizes the importance of patient-individualized treatment and a treatment-specific approach for each type of plastic surgical procedure. In this review, we focus on the management of acute postoperative pain and provide an overview of the different modalities. The physiology of pain is described and recommendations for acute postoperative pain management based on patient-specific factors are discussed.

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PHYSIOLOGY OF PAIN

The pain pathway comprises four steps: transduction, transmission, modulation, and perception. Nociceptors are receptors in tissues that are activated specifically by painful stimuli and cause nociceptive pain. These receptors transduce an electrical signal from the periphery to the central nervous system along axons.[11,12] Nociceptive pain describes pain from physical damage and responds well to treatment with opioids.[13] Neuropathic pain is often associated with damage to the neurologic system and is described as a shooting pain or burning sensation. Pain transmission is strictly dependent on the balance of the excitatory and inhibitory influences that act on the neuron circuits of the somatosensory system.[14] Melzack and Wall's gate control theory of pain describes modulation as the mechanism by which the descending pathway of the brain alters the intensity of the pain signal, depending on the circumstance that initiates the nociceptive signal.[15,16] This breakthrough theory explains why rubbing a painful area soothes the pain. Moreover, it is the foundation of how transcutaneous electrical nerve stimulation (TENS) units work.[17] TENS is a therapy that involves the use of low-voltage electric currents to treat pain. The effectiveness of TENS treatment for people with a variety of pain conditions remains controversial.[17] Numerous theories have been postulated to describe mechanisms underlying pain perception. The most accepted theory states that the more intense a noxious stimulus is, the more unpleasant it will be. However, the perception of pain could be modulated by affective-motivational components of pain to alter the perception (ie, cognitive modulation of pain).[18]

ASSESSMENT OF PAIN

Validated Pain Rating Scales

Pain rating scales are commonly used to identify, manage, and track the perceived intensity of pain. Changes in pain severity and intensity are a key indicator for course of treatment.[19] Commonly used and validated scales are the visual analogue scale (VAS), the numerical rating scale (NRS), the verbal rating scale (VRS), and the Faces Pain Scale–Revised (FPS-R) (Fig. 1).[20] The VAS is presented as a 10-cm line, visualizing a scale ranging from "no pain" to "worst imaginable pain." The patient is asked to physically mark a score that fits best with the situation.[21–23] The NRS is a numeric 11- or 21-point scale where the end points indicate the extremes of "no pain" and "worst possible pain." The VRS comprises five to seven word categories (ie, no/mild/moderate/severe/worst possible pain). This prompts the patient to translate the sensation into words, but does not necessarily reflect the intensity of the pain.[24] The NRS, VAS, and VRS are commonly used in adults; the FPS-R has proven effective with children and older individuals. This scale shows six facial expressions that can be matched with numeric pain intensity scores. The faces are depicted without smiles or tears to avoid confusion between pain intensity and distress.[25–30]

Implications of Pain Rating Scales

Measuring pain intensity accurately is difficult because pain is subjective,[31] self-reported,[32] and multifaceted, including cognitive, physical, sensory, behavioral, and sociocultural factors.[33] When comparing pain rating scales in adults, numerous studies show that the NRS is preferred because of ease of use, higher compliance rates, better responsiveness, and good applicability compared with the VAS and VRS.[34] The VRS and FPS-R are reported to be more influenced by pain catastrophizing and interference (ie, the social consequences of pain, emotional distress).[35] Furthermore, the intensity of pain is influenced by the meaning of pain to the patient and its expected duration.[36] Acute or chronic pain can result in altered behavior, dysfunction, or disabilities. Although acute pain can be measured reliably by common pain rating scales, the accuracy of the perceived intensity of chronic pain is more likely to be influenced by anxiety and fear.[36,37]

MANAGEMENT OF ACUTE POSTOPERATIVE PAIN

Managing acute postoperative pain plays an essential role in facilitating the recovery of the patient to normal function.[38] Research suggests that fewer than half of all patients undergoing surgery report adequate postoperative pain relief.[39] It is key to reduce the incidence of adverse physiologic and psychologic effects associated with inadequately controlled pain.[38] Thus, it is recommended that managing postoperative pain commences preoperatively. Clinicians can provide individually tailored education and pain management plans to the patient through a shared decision-making approach and discussion of treatment options. Preoperatively, education points should include the expectation of pain and the options for pain management, including local, topical, regional (eg, nerve blocks), and systemic anesthesia. Individually tailored education preoperatively is proven to result in beneficial effects, including less preoperative anxiety, fewer

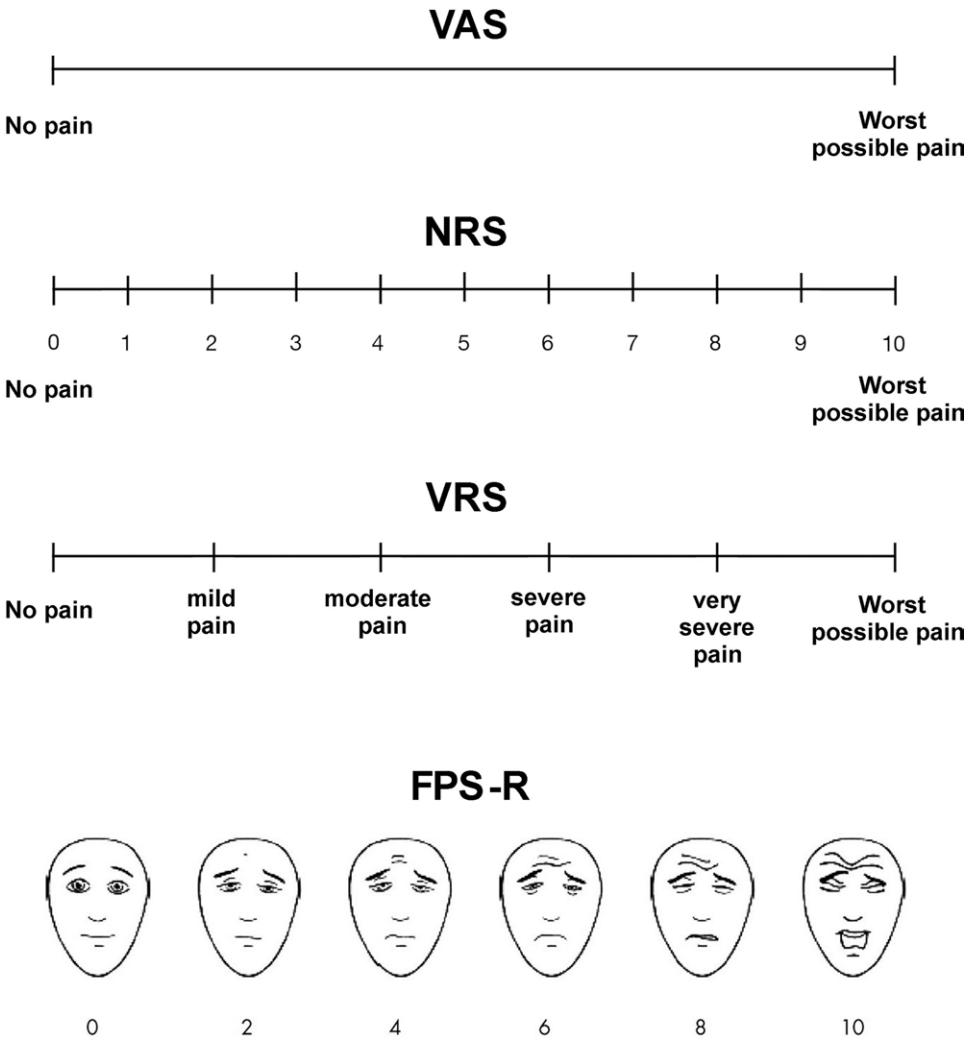

Fig. 1. Validated pain rating scales. Commonly used and validated scales are the visual analogue scale (*VAS*), the numerical rating scale (*NRS*), the verbal rating scale (*VRS*), and the Faces Pain Scale–Revised (*FPS-R*). Used with permission from T. M. Saffari and colleagues. Copyright © 2023 T. M. Saffari and colleagues. All rights reserved.

requests for sedative medications, reduced postoperative opioid consumption, and reduced length of stay after surgery.[38,40,41]

Preoperative consultation should also aim at assessing medical and psychiatric comorbidities, concomitant medication, history of chronic pain, substance abuse, and response to previous postoperative treatment. Postoperatively, education should focus on how to adequately manage and document the pain. Obesity poses a challenge in opioid administration as this patient population is at increased risk for respiratory depression or sleep apnea. Therefore, in this population, regional anesthesia techniques and avoiding sedative analgesics are preferred.[41,42] Predisposing risk factors for persistent opioid use are suggested to be female sex, adolescent age or older than 50 years, and a preexisting history of depression or illicit drug, alcohol, antidepressant, or benzodiazepine use.[41,43] Postoperatively, pain should be assessed and reassessed in rest as well as movement, to ensure a patient's ability to participate in postsurgical rehabilitation.[41]

After discharge, patients should be reminded how to track and manage their pain by self-reporting, including the use of mobile applications. Furthermore, education points include when and whom to contact in case of questions, how to reduce the use of pain medication, and how to dispose of unused opioids.[41,44] It has been suggested that dissemination of an educational brochure significantly improves the disposal of unused opioids after surgery, decreasing the amount of excess opioids circulating in communities.[45]

MULTIMODAL POSTOPERATIVE ANALGESIA

Postoperative pain is best treated with multimodal analgesia (MMA), which is defined as the use of a variety of analgesic medications and techniques that target different receptors and mechanisms of action in the peripheral and central nervous system. MMA protocols are used to potentiate the effects of opioids. Compared with single-modality interventions, using MMA may result in additive or synergistic effects, superior pain relief, and reduced reliance on opioid medications.[41,46–51] However, different side effects of each modality and interference with other treatments should be monitored.[41,47] An overview of multimodal management for postoperative pain is depicted in Figure 2 and discussed in detail in the following.[52]

Acute Postoperative Pain Management

Systemic Analgesia

Despite an ongoing opioid epidemic, opioids remain the cornerstone of perioperative pain management, including in the treatment of acute postoperative pain.[53,54] Opioids should be coupled with MMA options, tailored to the type of pain a patient is experiencing, with the goal of using the lowest amount of opioid possible.[55] Personalized opioid prescription models could be used to accurately estimate postdischarge opioid consumption and decrease the risk of developing persistent opioid use.[56] Opioids are associated with severe side effects, which are discussed in a later section. Nonsteroidal anti-inflammatory drugs (NSAIDs) act by inhibiting the enzyme cyclooxygenase (COX) and are associated with side effects including peptic ulcer disease, gastrointestinal hemorrhage, renal dysfunction, platelet dysfunction, and altered liver function.[57] For patients with a history of gastrointestinal injury, prolonged use of NSAIDs, advanced age, or concurrent use of aspirin or corticosteroids, the risk of gastrointestinal complications such as upper gastrointestinal bleeding is increased. In these cases, gastroprotective agents or alternative NSAID formulations such as COX-2 inhibitors are preferred.[58,59] Lumiracoxib has the highest degree of selectivity for COX-2. Meloxicam is preferred over COX-1 inhibitors as it has greater affinity to COX-2 inhibition compared with COX-1 inhibition, similar to celecoxib and diclofenac.[60] These drugs, together with acetaminophen, are more potent than naproxen, ibuprofen, and indomethacin.[61]

The use of gabapentinoids in acute postoperative pain management remains controversial.[62,63] It is imperative that the use of gabapentinoids be tailored to the type of surgery and limited to patients who are at high risk of developing neuropathic pain from surgery. For patients who underwent abdominal wall reconstruction, postoperative gabapentin administration was not associated with an increase in adverse effects.[52] Whereas its effect on neuropathic pain can take up to two weeks to work, gabapentinoids should be provided as part of the MMA protocol to ensure that pain is controlled in the acute setting as well.

Table 1 provides an overview of the pharmacotherapeutic MMA regimen including indications and considerations.[6,60,64] Alternative medication options are also provided. Patients with allergies to the medications should not be given these medications or should be provided alternative medications within the same drug class, depending on the allergy severity.[60]

Regional Analgesia

Regional anesthesia is effective, safe, economical, and results in fewer systemic side effects. Moreover, it allows for faster postoperative recovery and prevention of general anesthesia complications in patients with sleep apnea, chronic obstructive pulmonary disease, or coronary artery disease.[65] Epidural analgesia distributes the drug in the epidural space and potentially provides full pain blockade below the level of insertion.[66] It is superior to systemically administrated drugs because of its higher potency, explained by its proximity to the opioid and alpha-agonist receptors in the dorsal horn.[67] Perioperative and postoperative epidural analgesia could be used in plastic surgery patients undergoing abdominal-wall reconstruction, liposuction, or breast surgery.[68] Patients undergoing breast surgery could also benefit from regional nerve blocks, such as paravertebral, intercostal, serratus anterior, erector spinae plane, or pectoralis blocks. Transversus abdominis plane blocks could be used in abdominoplasty and abdominal-based flap reconstruction (eg, breast and abdominal-wall reconstruction), among others.[68–70] For hand and shoulder surgery, brachial plexus blocks can be applied to achieve successful neural blockade. The axillary approach, infraclavicular approach, and supraclavicular approach are commonly used for the hand; the interscalene approach is used for shoulder and upper-arm surgery. Axillary, supraclavicular, and infraclavicular approaches have similar success rates when performed with

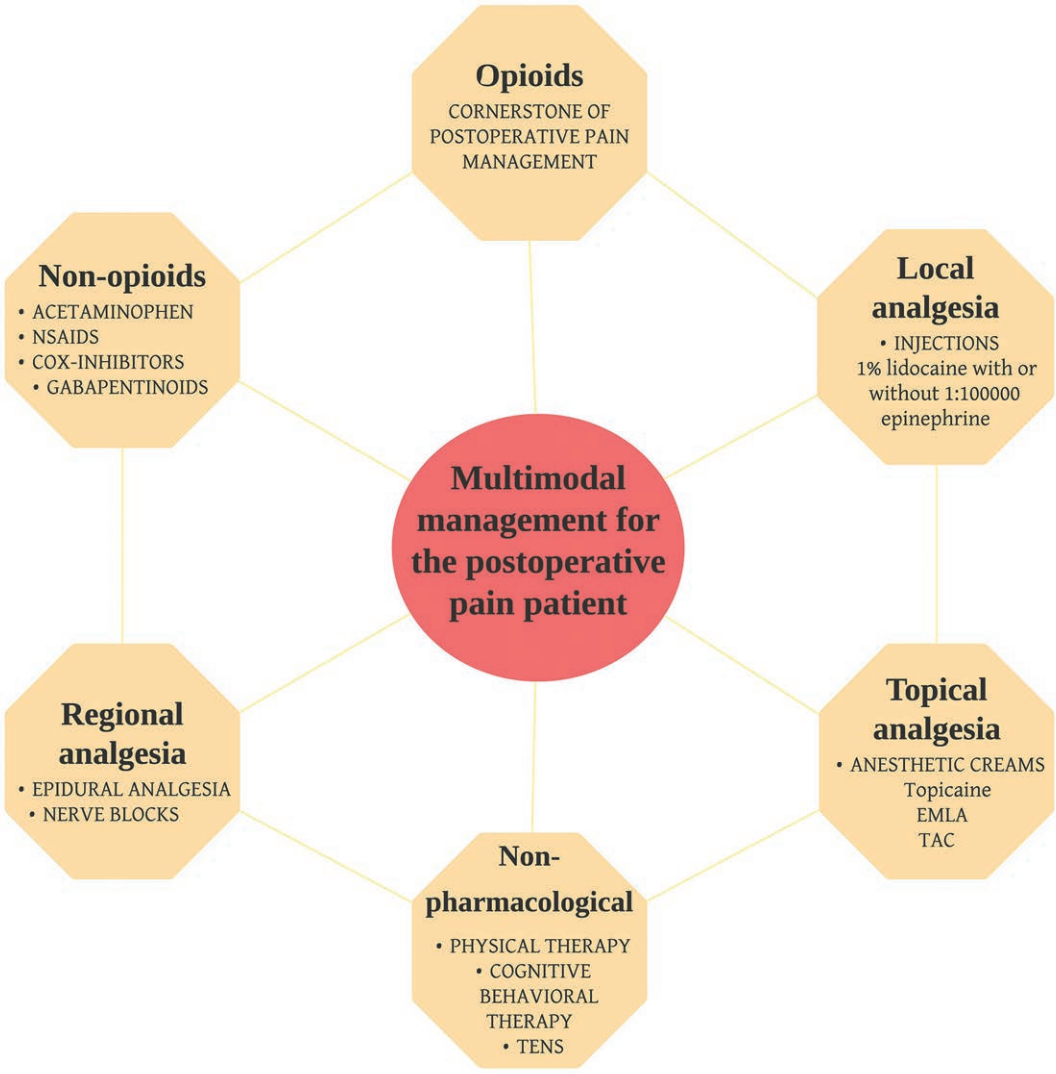

Fig. 2. Schematic overview of multimodal analgesia (*MMA*) for postoperative pain management. To manage pain, step 1 of the MMA includes nonopioid treatment [eg, acetaminophen, nonsteroidal anti-inflammatory drugs (*NSAIDs*), cyclooxygenase (*COX*) inhibitors, gabapentinoids (gabapentin and pregabalin to prevent central sensitization)]. If insufficient, opioids are added to the management (step 2, weak opioids; step 3, strong opioids). Step 4 of MMA includes local, topical, and regional anesthesia. Perioperative and postoperative epidural analgesia and peripheral nerve blocks are part of regional analgesia, which are used for a variety of surgical procedures in both inpatient and outpatient settings. Nonpharmacologic treatments such as physical therapy, cognitive behavioral therapy, and transcutaneous electrical nerve stimulation (*TENS*) could aid in managing postoperative pain when combined with other modalities. Topical anesthetic creams include Topicaine (4% lidocaine gel), EMLA (2.5% lidocaine and 2.5% prilocaine), and TAC (0.5% tetracaine, 1:2000 adrenaline, and 11.8% cocaine). Local analgesia (1% lidocaine with or without 1:100,000 epinephrine) is often used in hand surgery or cosmetic surgery. Used with permission from T. M. Saffari and colleagues.

ultrasound guidance.[71] Kettner et al.[72] demonstrated superior pain control with regional blocks compared with opioid-based analgesia in a meta-analysis, which has been corroborated by others.[73]

Local and Topical Analgesia

Local anesthetic infiltration is often used for wrist or digital nerve blocks in hand surgery. Carpal-tunnel release, Dupuytren release, trigger-finger release, and tendon repair are often

Table 1. Medications Used in Multimodal Management for Surgical Patients

Multimodal Agent	Indications	Dosage	Contraindications and Important Considerations	Side Effects
Acetaminophen	Base of MMA, recommended in all patients unless contraindicated	Preoperatively: 1000 mg PO/PR/IV ×1 Postoperatively: 650–1000 mg q6h	Hepatoxicity when used above the maximum dosage of 4 g per 24 hours; avoid in patients with known liver disease	Most commonly experienced with long-term use: nausea and vomiting, fatigue, anorexia
NSAIDs	Base of MMA, recommended in all patients unless contraindicated	Intraoperatively: ketorolac 15–30 mg IV ×1 Postoperatively: ketorolac PRN • IV: 30 mg as single dose or 30 mg q6h; not to exceed 120 mg/day • IM: 60 mg as single dose or 30 mg q6h; not to exceed 120 mg/day • PO: intended as a continuation of IV or IM therapy; 20 mg to start, then 10 mg q4h–q6h; not to exceed 40 mg/day Ibuprofen 600–800 mg PO q6h–q8h PRN Naproxen 500 mg PO q12h	Increased risk of gastrointestinal complications in case of history of gastrointestinal injury, advanced age, or concurrent use of aspirin or corticosteroids; avoid in patients with acute or chronic renal disease or iatrogenic acute renal injury Ketorolac: duration of ketorolac therapy should not exceed 5 days; risk for acute renal failure and hyperkalemia with prolonged use	Stomach ulcers or reflux, headache, allergic reaction
COX-2 specific inhibitors (celecoxib)	When NSAIDs are contraindicated	Preoperatively: celecoxib 400 mg PO ×1 Postoperatively: celecoxib 200 mg PO TID	Contraindicated in preexisting coronary artery disease because of association with higher rates of cardiac events; avoid in patients with acute or chronic renal disease and iatrogenic acute renal injury	Constipation, nausea, and vomiting
Opioids	Second step of acute pain management when nonopioid treatment is not sufficient	Oral options: • Oxycodone 5 mg q4h PRN • Morphine 7.5–15 mg q4h PRN • Hydromorphone 2–4 mg q4h PRN Intravenous options: • Hydromorphone 0.5–1 mg q3h–q4h PRN • Morphine 2–4 mg q3h–q4h PRN Alternative in case of allergies: • Fentanyl 25–50 μg q1h–q2h PRN	Caution in patients with abuse history or potential, history of alcohol consumption, obstructive sleep apnea, advanced age, or concurrent use of other sedative medications	Addiction, respiratory depression, constipation
Gabapentinoids (eg, gabapentin and pregabalin)	Useful in patients with higher risk for persistent postoperative pain	Preoperatively: gabapentin 300–1200 mg Postoperatively: gabapentin 300–600 mg TID	Caution in patients with advanced age, morbid obesity, reduced lung function, or obstructive sleep apnea; dose adjustment in patients with renal impairment	Dizziness, somnolence, respiratory depression
Dexamethasone	Reduce postoperative pain through anti-inflammatory mechanisms	Intraoperatively: 0.1–0.2 mg/kg, most commonly 8 mg	Problematic for patients with hyperglycemia or insulin usage, but this is not a strong contraindication	Surgical side effects include delayed wound healing, increased surgical-site infections, hyperglycemia
Muscle relaxants (eg, cyclobenzaprine)	As adjuncts in MMA treatment when pain is not controlled with standard MMA and operation involves high likelihood of muscle spasm or tension	Cyclobenzaprine 5–10 mg TID Methocarbamol 500–750 mg q6h Tizanidine 2 mg TID	Caution in older patients because of increased risk of fall owing to sedation or delirium	Seizures, drowsiness, dizziness, dry mouth, fatigue

COX, cyclooxygenase; IM, intramuscular; IV, intravenous; MMA, multimodal analgesia; NSAID, nonsteroidal anti-inflammatory drug; PO, per os (by mouth); PR, per rectal; PRN, pro re nata (as needed); TID, three times daily.

performed under local anesthesia without tourniquet,[74] called wide-awake local anesthesia no tourniquet (WALANT) hand and wrist surgery.[75] Patient satisfaction is increased when using the WALANT technique in an office-based setting compared with the ambulatory day surgery setting. WALANT anesthesia improved patient satisfaction when compared with sedation and monitoring techniques, irrespective of the surgical setting and location.[76] Local analgesia typically involves subcutaneous injection of 1% lidocaine, which interrupts axon depolarization by preventing Na^+ influx into the neuron, combined with 1:100,000 epinephrine, to provide vasoconstriction. The vasoconstrictive property decreases the anesthetic dissolution into the bloodstream and ultimately allows a higher maximum anesthetic dose.[77] Besides hand surgery, a trend toward increased use of local anesthetics is seen in cosmetic surgery of the head and neck.[78] For abdominal surgery, surgical-site infiltration techniques provide excellent postoperative pain relief. In peritoneal, musculofascial, and subdermal tissues, where pain foci originate, 1 to 1.5 mL is injected every 1 to 2 cm of surgical incision per layer using a 22-gauge, 1.5-inch needle (ie, continuous motion fanning technique) at the time of incision closure.[79] Liposomal bupivacaine as part of MMA significantly decreases the mean length of stay (5.8 days versus 9.2 days in controls; $P = 0.004$), costs, and 30-day readmission rates.[80]

Tumescent analgesia is a method of infiltrating a very dilute solution of a local anesthetic, commonly lidocaine, combined with epinephrine and sodium bicarbonate into tissue until it becomes firm and tense (ie, tumescent). This technique was first described by Klein[81] in the late 1980s. An upper limit of 35 mg/kg lidocaine has been proven to be safe and effective.[82–84] Tumescent analgesia could be used for breast, body, and face, and combined with other modalities of MMA.[82–85]

Topical anesthetic creams are used in plastic surgery when injections are avoided or to reduce needle anxiety and pain and edema at the surgical site before injection. Commonly used creams are Topicaine (4% lidocaine gel), EMLA cream (2.5% lidocaine and 2.5% prilocaine), and TAC (0.5% tetracaine, 1:2,000 adrenaline and 11.8% cocaine). With the use of topical creams, children and patients older than 65 years can undergo minor procedures without general anesthesia.[86] Nonpharmacologic interventions include physical therapy, acupuncture, cognitive behavioral therapy, and TENS. These supportive therapeutic modalities are often combined with pharmacologic therapy.[87]

An algorithm for acute pain management based on clinical indication is provided in Figure 3.[66,69,80,82,88,89]

Opioids: Guidelines and Side Effects

Opioids act primarily on mu opioid receptors in the central nervous system,[90] and can modify afferent pain signals by binding to opiate receptors, resulting in the reduction of pain perception.[91] It is recommended that opioids be administered orally as opposed to intravenously when possible.[38] Although oral administration results in a slower time of onset, it generates a more steady and long-lasting analgesic effect.[92] Other routes of administration are sublingual, transdermal, or neuraxial.[57] Parenteral routes include intramuscular, intravenous, or subcutaneous administration. Parenteral administration provides a faster onset of action of the drug and bypasses the liver first-pass effect. In some cases of moderate to severe pain, the use of patient-controlled analgesia devices in the hospital is recommended without routine basal infusion of opioids.[38] Patient-controlled analgesia devices increase the patient's autonomy by allowing self-administration of low doses of opioids and reduce the nursing burden, resulting in greater effectiveness and patient satisfaction. Administration by proxy should be avoided in adults with proper monitoring, especially when patients are sleeping.[38,93] However, the use of opioids is associated with increased side effects and it should not be combined with epidural analgesia.[93] Well-known side effects include nausea, vomiting, pruritus, sedation, constipation, respiratory depression, and opioid-induced hyperalgesia.[88,94] Furthermore, opioids lose their potency rapidly, resulting in tolerance.[66,95]

Patients who have been prescribed opioids postoperatively have the potential to become persistent opioid users, even if they were previously opioid naive,[96,97] ranging from 5% to 14% of cases, because of the well-established addictive potential.[98–100] Recent studies found that outpatient plastic surgery patients only use half of the prescribed opioids, which indicates an opportunity to reduce opioid prescription.[101–103] Eighty-three percent of patients do not store opioids in a locked location, and 64% do not dispose opioids after 1 month, as recommended by the manufacturer.[103] Moreover, another study showed that the majority of plastic surgery patients do not expect postoperative opioids and prefer nonnarcotic postoperative treatment.[104] Overprescribing by surgeons is proven to result in unintended distribution of unused opioids into society, or its redirection for illicit abuse.[105,106] When opioids are prescribed for acute pain, it is

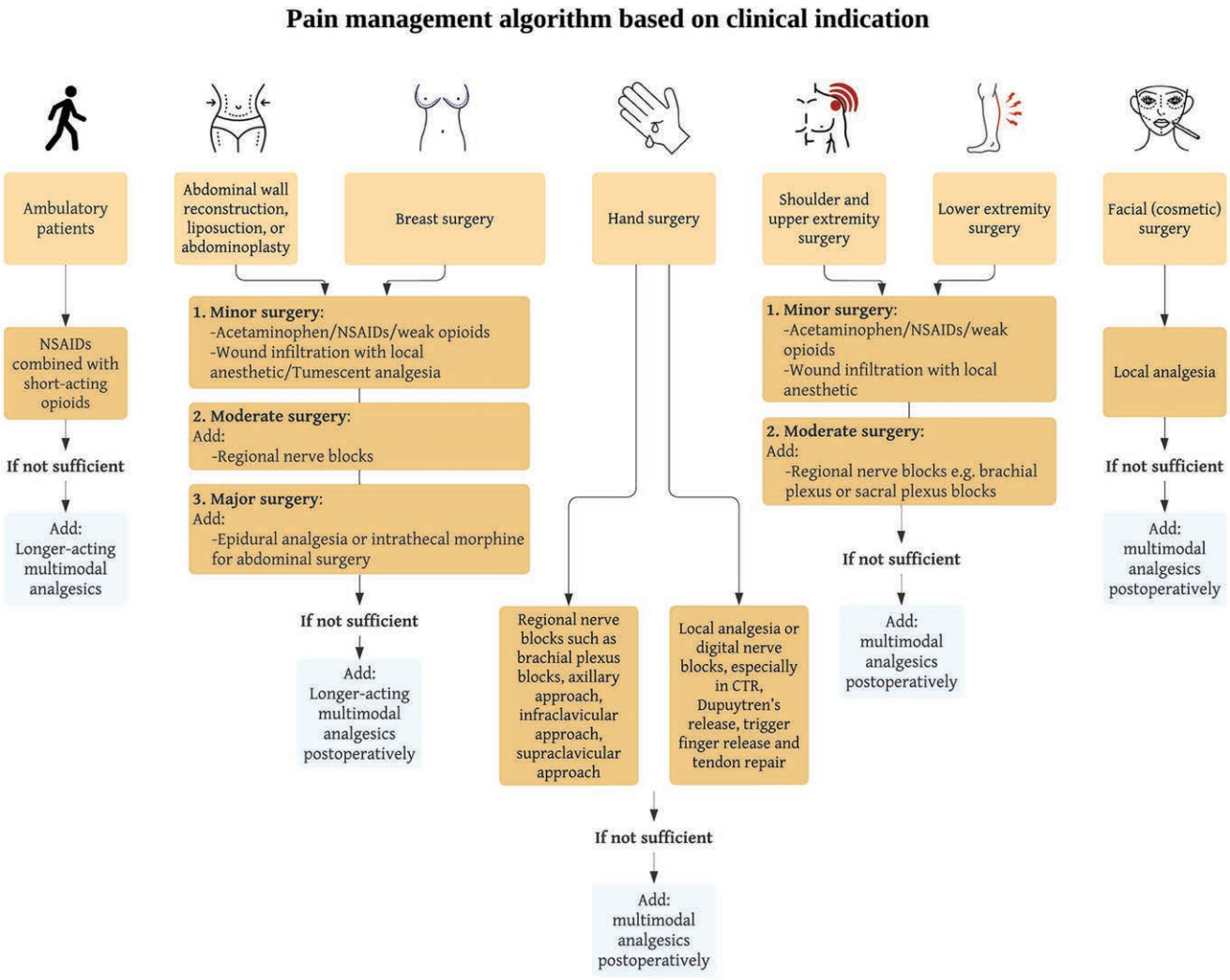

Fig. 3. Algorithm for acute pain management based on clinical indication. The ambulatory surgery category includes same-day surgical care that does not require hospitalization, also called outpatient surgery. Regional nerve blocks for abdominal surgery include blocks in the transversus abdominis plane (*TAP*) or liposomal bupivacaine. For breast surgery, regional anesthesia includes paravertebral, intercostal, serratus anterior plane (*SAP*), pectoralis (*PECS*), and erector spinae plane (*ESP*) nerve blocks. If the pain in any of the categories is not managed, additional analgesics according to the multimodal management (*MMA*) ladder (described in Fig. 2) are provided. *CTR*, carpal tunnel release; *NSAID*, nonsteroidal anti-inflammatory drug. Used with permission from T. M. Saffari and colleagues. Copyright © 2023 T. M. Saffari and colleagues. All rights reserved.

recommended by the Centers for Disease Control and Prevention to prescribe the lowest effective dose of immediate-release opioids for a maximum of 3 days. Clinicians should review the patient's history of controlled substance prescriptions using the state prescription drug monitoring program data to perform a risk assessment and determine the patient's opioid use before prescribing opioids.

Using patient satisfaction as an indicator of pain control has limited validity. If patients are not fully educated on the complications of unrelieved pain, this may lead to chronic pain. In ambulatory surgery patients, pain is the leading reason why patients cannot be transferred from phase I to phase II recovery in under 50 minutes from surgery. Pain scores were reported to be lower when using MMA,[95,107] resulting in increased efficiency and compliance across the health care system and decreased costs.[50,64] Plastic surgery patients should be routinely educated on the medical risks of opioids, regarding postoperative side effects and potential for abuse, the purpose and importance of MMA and alternatives to opioids, as well as proper use of medication.[64] A national survey reported that only two-thirds of patients were provided education on pain management before surgery. Overall, nurses were more likely than other health care professionals to educate patients about their pain management.[108]

NEW PAIN TREATMENTS

The U.S. Food and Drug Administration has recently approved Seglentis (celecoxib and tramadol hydrochloride) for the management of acute pain in adults that is severe enough to require an opioid analgesic and for which alternative treatments are inadequate. This drug combines an NSAID and an opioid agonist, and could be administered orally at an initial dose of two tablets every 12 hours as needed for the relief of pain. Side effects include respiratory depression, addiction, increased risk of cardiovascular thrombotic events, nausea, vomiting, and gastrointestinal adverse events.[109] The integration of pharmacologic sciences with bioengineering has been a step toward achieving a steady or pulsatile delivery in a controlled fashion, with fewer side effects. Pharmacoplastic surgery is an emerging concept that describes the use of a device with pharmacologic components to augment the safety or efficacy of a certain device in the field of plastic surgery.[110] Drug-eluting biomaterials, such as sutures, provide better wound healing, tissue healing, and a sustained drug delivery system to wound sites.[110]

CONCLUSIONS

To increase patient satisfaction and effective pain control, it is recommended to commence managing postoperative pain preoperatively and educate patients on the complications of unrelieved pain, how to track and monitor their pain by self-reporting, and how to reduce the use of pain medication. Multimodal pain therapy combines various approaches (eg, systemic analgesia, regional analgesia, local analgesia, nonpharmacologic interventions), resulting in increased patient satisfaction and reduced opioid use. The use of local analgesia (eg, topical or tumescent analgesia) leads to shortened hospital stays, reduced hospital costs, and effective pain control. Individually tailored education on pain management helps set expectations, decrease complications, and facilitate early rehabilitation. Clinicians can provide these plans to the patient through a shared decision-making approach, discussing treatment options, expectations, and pain treatment goals.

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