

Post Surgical Pain: Complex Response to Tissue Trauma during Surgery

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Abstract

Pain assessment and reassessment are required to provide optimal postoperative pain care. Pain assessment helps determine whether pain management is adequate, whether analgesic or analgesic dose changes are required, whether changes in the postoperative pain management plan or additional interventions are warranted, and in the case of difficult to manage pain whether specialty consultation or other measures are needed. Because pain is inherently subjective, patient self-report is the primary basis of all pain assessments.

Keywords: Clinicians; Pain assessment; Clinical trials; Pain measure; Techniques; Pain behaviours

Introduction

For patients who cannot adequately report their pain because of cognitive deficits, sedation, developmental stage, or other factors, clinicians might need to use behavioural assessment tools and solicit input from caregivers to assess pain. In all cases, clinicians should not rely solely on objective measures such as pain-related behaviours or vital signs in lieu of patient self-report to determine the presence or intensity of pain because such measures are neither valid nor reliable. At similar levels of pain, pain behaviours might vary markedly between individuals [1]. Therefore, although assessments of pain behaviours might supplement information from self-reported pain, it is important to interpret behavioural observations cautiously. A number of pain assessment tools have been validated for accuracy in detecting the presence of and quantifying the severity of pain, and have been tested for intra-patient and inter-rated reliability [2]. Validated pain assessment tools use different methods to measure pain, including visual analogue scales, numeric or verbal rating scales, symbols, and others.

Discussion

The panel recommends that clinicians use a validated pain assessment tool; although there is inadequate evidence on the effects of different pain assessment tools on postoperative pain outcomes to guide recommendations on which specific tools to use. Therefore, the selection of a particular pain assessment tool should be on the basis of factors such as developmental status, cognitive status, level of consciousness, educational level, and cultural and language differences. In children, the Paediatric Initiative on Methods, Measurement, and Pain Assessment in Clinical Trials group suggests the use of the Face, Legs, Arms, Cry, Consolability and Parents Post-operative Pain Measure for assessing acute pain in preverbal and nonverbal children on the basis of the reliability, validity, and ease of use [3]. Tools that have been developed for use in the intensive care unit setting include the Behavioural Pain Scale and the Critical-Care Pain Observation Tool. Pain assessment involves more than just quantifying the intensity of pain. High pain intensity ratings or behavioural scale scores that do not respond to usual care should be investigated to determine whether the pain might be due to a new medical issue or surgical complication and the potential role of opioid tolerance and psychological distress. Assessment should determine what interventions have been effective for the pain, how the pain affects function, the type of pain, and whether there are barriers to effective pain management, such as cultural or language differences, cognitive deficits, or patient misconceptions about pain management. In addition, it is not sufficient to assess pain

only at rest [4]. Pain that is relatively well controlled at rest can be severe during movement or with specific activities that cause increased pain, with important implications for symptom management and recovery. The panel suggests that clinicians assess pain at rest and with activities, as the latter is often more severe and difficult to control than pain at rest. Presence of pain with activity has important implications for use of additional interventions and discharge planning. For example, pain that is well controlled at rest but severe with movement can have major effects on a patient's ability to participate in postsurgical rehabilitation and return to normal function, and pain with swallowing after tonsillectomy could increase risk for dehydration. Assessments for other clinical issues such as sedation, delirium, and nausea or other side effects related to interventions are also important to help guide decisions regarding adjustment of the postoperative pain management plan [5]. The timing of assessments after administration of an intervention should be informed by the time to achieve peak effects, which is typically 15 to 30 minutes after parenteral drug therapy or 1 to 2 hours after administration of an oral analgesic. With non-pharmacologic interventions, pain relief often occurs during or immediately after their application. The optimal frequency of reassessment is likely to depend on a number of factors, including the type of surgical procedure, the adequacy of initial pain relief, the presence of side effects, presence of comorbidities, and changes in clinical status. Reassessments might be performed less frequently for patients with more stable pain [6]. Pain reassessments might be useful at the time of nursing shift changes or with new caregivers to establish a baseline and promote continuity of care, although evidence showing that routine reassessment of pain at nursing shift changes is associated with improved clinical outcomes is not available. Multimodal analgesia, defined as the use of a variety of analgesic medication and techniques that target different mechanisms of action in the peripheral and/or central nervous system might have additive or synergistic effects and more effective pain relief compared with single-modality interventions. For example, clinicians might offer local anaesthetic-based regional analgesic techniques in combination

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with systemic opioids and other analgesics as part of a multimodal approach to perioperative pain. Because of the availability of effective non-opioid analgesics and non-pharmacologic therapies for postoperative pain management, the panel suggests that clinicians routinely incorporate around the clock non-opioid analgesics and non-pharmacologic therapies into multimodal analgesia regimens [7]. Systemic opioids might not be required in all patients. One study suggests that it should be avoided when not needed, because limited evidence suggests that perioperative opioid therapy might be associated with increased likelihood of long-term opioid use, with its attendant risks. Randomized trials have shown that multimodal analgesia involving simultaneous use of combinations of several medications acting at different receptors. Addition of non-pharmacological interventions might result in additional effects consistent with the biopsychosocial model of pain. For any given situation, a number of potential multimodal combinations are possible, and different multimodal regimens might be appropriate, depending on the specific surgery, individual clinical factors, and patient preferences. Subsequent sections of this guideline provide more specific recommendations on the different components of multimodal analgesia. In general, the use of local anaesthetic-based regional anaesthesia techniques for surgical procedures of the extremities, abdomen, and thorax is encouraged, because of the multiple trials that showed their effectiveness in combination with systemic analgesics [8]. Selection of multimodal therapies is a challenge because for each surgical procedure, many potential multimodal therapy combinations are possible, but relatively few have been evaluated in rigorous trials. On the basis of the available evidence and panel consensus, the options for components of multimodal therapy for several commonly performed surgeries are summarized in. Techniques not typically used together are intra-articular, peripheral regional, and neuraxial techniques [9]. Physical modalities include transcutaneous, acupuncture and related interventions, massage, cold therapy, localized heat, warm insufflation, continuous passive motion, and immobilization or bracing. Acupuncture involves the placement of needles into the body at defined acupuncture points. Related interventions that also involve stimulation of defined acupuncture points include acupressure, auricular acupuncture, electro-acupuncture, and others. Evidence on the effectiveness of needle acupuncture to the body for postoperative pain in adults is mixed, with some trials showing no beneficial effects on postoperative pain or analgesic use compared with sham acupuncture or analgesic use. Cold therapy refers to the superficial application of cold to the surface of the skin, with or without compression and with or without a mechanical recirculating device to maintain cold temperatures. Localized cold therapy has commonly been used in acute pain, including postoperative pain, with potential benefits at the site of injury thought to be related to reductions in tissue temperature, resulting in reduced edema and local analgesia. Cognitive-behavioural modalities can be provided to patients by a variety of practitioners, including psychologists, psychotherapists, nurses, physicians, social workers, and child life specialists. Most studies of cognitive-behavioural modalities showed some positive effects on postoperative pain, analgesic use, or anxiety, with inconsistent or unclear effects on duration of hospitalization [10]. In general, cognitive-behavioural modalities are non-invasive, and do not appear to be associated with significant harm. Although studies of cognitive-behavioural modalities have primarily been conducted in adults, a small number of studies of guided imagery and music have been conducted in children. Results have been inconsistent in terms of showing benefit on outcomes related to postoperative pain, with studies reporting limited detail on how interventions addressed specific developmental considerations in

children. Most evidence suggests that administration of opioids is not superior for postoperative analgesia compared with oral administration. Therefore, oral administration of opioids is generally preferred for management of postoperative pain in patients who can use the oral route. Postoperative pain is often continuous initially and often requires round-the-clock dosing during 24 hours. Long-acting oral opioids are generally not recommended or labelled for use in the immediate postoperative period because of the need to titrate doses and the lack of evidence showing superiority over short-acting oral opioids, with the possible exception of patients who receive long-acting opioids before surgery. Preoperative administration of opioids is not recommended as an intervention to decrease postoperative pain and/or opioid consumption, because studies show no clear benefit from this practice. Clinicians should counsel patients to continue regularly prescribed opioids during the preoperative period unless there is a plan to taper or discontinue opioids.

Conclusion

Once the ATP binds to the P2X3 receptors, Na⁺ can cross these channels and induce membrane depolarization, hence activating various Ca²⁺-sensitive intracellular processes and causing both pain and hyperalgesia. ATP can pre-synaptically act on the nociceptors to increase the release of glutamate. On the other hand, ATP produces a by-product from its metabolism, adenosine, which binds to either adenosine type 1 receptor Gi-PCRs for inhibitory action or binds to the adenosine type 2 receptor Gs-PCRs that are located peripherally and centrally to sensitize the nociceptors via the cAMP/PKA signalling pathways.

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Conflict of Interest

None.

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