World Journal of Pharmaceutical Science and Research
www.wjpsronline.com
Review Article
ISSN: 2583-6579
SJIF Impact Factor: 3.454
Year - 2022
Volume: 1; Issue: 1
Page: 35-42

A REVIEW ON ACUTE PAIN MANAGEMENT

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Article Received: 14 August 2022 | | Article Revise: 06 September 2022 | | Article Accepted: 28 September 2022

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ABSTRACT

Pain that is brought on by an accident or illness and goes away when the body recovers is considered acute pain. The discomfort that lasts longer than the period allotted for recovery is what we call chronic pain. Patients experiencing acute pain after surgery, as well as those who have suffered trauma or have a serious medical condition, are common clinical observations. The difficulty in documenting the total incidence of acute pain is exacerbated by this, and estimates may be too low. Pain management, also known as pain medicine, pain control, or algiatry, is a medical specialty that takes a multidisciplinary approach to treating patients who suffer from chronic pain. Pain treatment teams often include of medical professionals, occupational therapists, and nurses. Alternative mental health practitioners and massage therapists may also be part of the team.

KEYWORDS: Acute pain, Analgesia, Opioid, Antagonist.

INTRODUCTION

The pain is a condition of physical, emotional, or mental unease that may vary from slight discomfort or dull anguish to severe, often terrible agony, may be localized or widespread, and is the result of being physically or psychologically harmed or hurt or of some derangement of or loss of balance in the bodily or mental functions. It typically results in a response of desiring to avoid, escape from, or eliminate the causative component.[1]

PATHOPHYSIOLOGY

Acute pain may result from a number of different pathophysiological processes, including injury, surgery, or cerebral hypoxia. The function of the central nervous system is to transmit information from the brain and spinal cord to the nerves and, from there, to the rest of the body. Important functions of the CNS are carried out by both its spinal and supraspinal components. Sensing pain requires input from both the peripheral and central neural systems. The sensory and motor nerves are part of the peripheral nervous system. Information and stimuli are taken in by afferent neurons, whereas efferent nerves transport the feeling to the muscles and set them into motion.[2] Chemical mediators such as catecholamine, cytokines, and inflammatory markers are released from damaged cells in response to tissue injury and the impacts of physical stress, setting off a chain reaction in the peripheral and central nervous systems that further

destroys tissue at the cellular level. These neurotransmitters in the periphery provide signals that heighten the unpleasantness of the procedure. The dorsal horn of the spinal cord acts as a relay station for these signals, which travel along afferent routes to the subcortical and cortical regions of the brain. The brain stimulates pain by contributing to its central transmission via the spinal cord, as stated in the Pain reference. Vasodilation, increased vascular permeability, and the activation of inflammatory cells result from this chain reaction at the cellular level, which in turn affects cardiovascular, gastrointestinal, renal, endocrine, respiratory, and metabolic functions and suppresses the immune system, raising the risk of postoperative infections and slowing the healing process. A higher risk of developing mental health problems like depression and anxiety is linked to ineffective pain management.

PAIN PATHWAYS

When an injury occurs, pain signals are sent to the brain from the body's many pain receptors. These pain receptors initiate the conduction of nerve impulses that travel all the way to the brain and spinal cord. When this occurs, the signal has succeeded in eliciting a reflexive response.[2] Without engaging the brain, muscles contract in response to the signal's arrival to the spinal cord, where it is processed and delivered back through motor neurons to the area of pain. In addition, the brain receives the pain signal. The brain has to interpret the signal as pain before the person is aware of it.[3]

Some areas of the body have a distinct set of pain receptors and nerve pathways than others. The intensity of the pain felt after an injury depends on the kind and location of the wound. The skin's pain receptors, for instance, are many and communicate detailed information about an injury's location and severity, such as whether it was caused by something sharp, like a knife wound, or something dull, like pressure, heat, or cold. On the other hand, the gut has few and inaccurate pain receptors.[4] You may squeeze, cut, or burn the gut and not feel any discomfort. However, something as seemingly innocent as a trapped gas bubble may induce significant intestine discomfort due to stretching and pressure. Gut pain is notoriously diffuse and hard to pinpoint, making it impossible for the brain to localize its source.[5]

TYPES OF PAIN

1. Nociceptive
2. Neuropathic

1. Nociceptive Pain: The sensory nerve system activates a reaction known as nociceptive processing in response to stimuli that are painful or might be harmful. When activated by extremes of chemical, mechanical, or thermal (hot and cold), sensory nerve cells called nociceptors send a signal through a network of nerve fibers via the spinal-cord to the brain.[6] Sentient creatures' diverse physiological and behavioral responses to nociception are often followed with a subjective feeling of pain.[7]

The majority of people's pain is of the nociceptive kind. Inflammation, chemicals, or physical events like stumbling over some furniture might activate the nociceptive nerve fibers, causing discomfort. Nociceptive pain is often severe and occurs suddenly in reaction to an illness or injury. As the injured area recovers, the discomfort subsides (Nociceptive pain, such as that caused by a fractured ankle, typically decreases as the ankle heals).

Causes of Neuropathic Pain

Injuries like this may result in nociceptive pain:

- Bruises
- Burns
- Fractures
- Pain in the joints from overuse or trauma.[8]

2. Neuropathic pain: When the nerve system is injured or not functioning normally due to illness or injury, this kind of pain is referred to in the medical community as neuropathic pain. Neurogenic pain, as opposed to nociceptive pain, is not triggered by a specific external stimulus. Damage to or illness of the somatosensory nerve system is the source of neuropathic pain.[9] Dysesthesia, or pain in response to stimuli that would not typically be felt as unpleasant, has been linked to neuropathic pain. It might occur in both a continuous and episodic fashion. In contrast, the latter feel like stabs or electric shocks. Feelings of heat and cold, tingling and numbness, numbness and itching, and other similar feelings are all typical.

Causes of Neuropathic Pain

Although the precise origins of neuropathic pain are unknown, several factors are commonly implicated:

- Alcoholism
- Amputation
- Chemotherapy
- Diabetes
- Issues with facial nerves
- HIV/AIDS infection
- Myeloma multifocal
- Multiple sclerosis
- Herniated discs, spinal arthritis, and other cause of nerve or spinal cord compression
- Shingles
- Spinal fusion
- Syphilis
- Thyroid issues[10]

MANAGEMENT OF PAIN

Pain management, pain medicine, pain control, etc., is a multidisciplinary medical specialty dedicated to reducing patients' suffering and enhancing their quality of life in the face of persistent pain.[11] Medical doctors, pharmacists, clinical psychologists, physical therapists, occupational therapists, physician assistants, and nurses make up the standard pain treatment team.[12] The group might also include of massage therapists and other experts in the field of mental health. When the underlying trauma or disease has healed, the pain often disappears quickly, and a single doctor may treat it effectively with medications like analgesics and sedatives. However, effective treatment of long-term pain often requires the concerted efforts of the management team.[13]

TREATMENT OF PAIN

Many different analgesic medications may be administered in various settings (the hospital, the community) to alleviate pain. This facilitates the clinician's ability to create a bespoke analgesic regime in cooperation with the patient, taking into account the other's specific pain, analgesic needs, and life circumstances.[14] Many aspects must be taken into account and comprehended before pain can be adequately treated. In addition to the duration, intensity, origin, and impact of the pain, the patient's preferences should be taken into account when selecting an analgesic medicine, the ideal form of administration, and the necessary dosing schedule.

METHOD OF DELIVERY

The mode of delivery should be decided in part by the characteristics of the chosen administration strategy as well as the patient's desire, physical state, etiology, and kind of pain.

- **Oral**

The most typical course of action suggested is administration. It's easy, cheap, and self-administered, so it's a great option. However, this method requires a well functioning gastrointestinal system and the onset time might be long.

- **Rectal**

Alternative to the oral route, however absorption is less conclusive patient agreement is necessary if the medication is not self-administered.

- **Intramuscular**

As an alternative to intravenous administration, particularly for opioid medicines, the procedure has been used on hospital wards out of concern for patient safety. It's uncomfortable for the sufferer and may result in an infection. In conditions of muscular hypo-perfusion, drug absorption may be very irregular.

- **Subcutaneous**

Evidence suggests that the subcutaneous method of medication administration is just as effective as the intramuscular route, but is more well tolerated by patients. However, it takes time to take effect, therefore a subcutaneous cannula may be required.

- **Intravenous**

The onset time is shortened by using this route. The highest risk of adverse pharmacological effects is associated with this method, which also requires the most highly trained workers, an intravenous cannula, and consequent infection risk.

- **Transdermal and transmucosal routes**

In addressing both chronic and cancer-related pain, the former method of opioid administration is widely used. Due to its long half-life, patch removal delay, gradual start, and slow offset, this approach is not well-suited for the treatment of acute pain.[15]

Patient Controlled Analgesia (PCA)

Multiple methods exist for patients to self-administer analgesic medicines, all of which fall under the umbrella term "patient controlled analgesia." The word often refers to the practice of giving oneself intravenous medications. Pain

during childbirth could be alleviated with the invention of a simple mechanical device that allowed patients to self-administer a weak solution of meperidine by opening a clamp.[16] Patient-controlled analgesia programs are becoming commonplace in many hospitals. Most typically, patients need analgesia for postoperative pain management. Many medical conditions and emergencies call for this technique, including pancreatitis, rib fractures, sickle cell crises, and acute exacerbations of chronic pain. To provide an opioid medication like morphine or fentanyl, which is the most prevalent use of PCA. Evidence suggests that its usage enhances analgesia and patient satisfaction in comparison to more traditional administration techniques.[17]

Opioid Analgesia

Opioid analgesics are often administered for severe pain, especially if it is coming from the digestive system. Acute pain and pain from cancer seem to have the most solid evidence of effectiveness and safety. In cases of moderate to severe acute pain, systemic opioids are the go-to therapy. Many diverse substances and preparations fall within this category of medication. Morphine is used as a benchmark against which novel opioids are evaluated.[18]

Oral opioids

Oral administration is the recommended method of dosing in the absence of severe acute pain or other contraindications. It is generally well-tolerated by patients and has few barriers to continuation in the community. When used appropriately, an opioid is just as effective as a parenteral opioid. Codeine, tramadol, morphine, oxycodone, and hydromorphone are all examples of opioids that may be taken orally.[19]

Intramuscular/Subcutaneous Opioid

The Edmonton Injector is a reliable, efficient, and inexpensive method of intermittent subcutaneous delivery of opioids for the management of cancer-related pain. Pain was effectively managed with few side effects when opioids were used subcutaneous injection on occasion. This has the potential to reduce in-hospital and out-of-hospital expenses for cancer patients' pain management. Providing cancer patients with intermittent subcutaneous opioid injections may be of particular importance in locations where both financial resources and opioid supply are restricted, such as developing countries.[20]

Intravenous Opioid

Opioid injections may be administered in bolus dosages, as a continuous infusion, or via a patient-operated analgesia system. When dealing with extreme acute pain, especially after surgery, this is the preferred choice. Due to the increased potential for respiratory depression with incorrect dose, this route requires extra attention to detail and care.[21]

NON-OPIOID/ADJUVANT ANALGESIC DRUGS

Acute pain is often treated with a combination of opioids and local anesthetic, although there are additional medicines that may be used alone or as an adjuvant.

Paracetamol/acetaminophen

One of the most widely prescribed drugs, paracetamol is often the first line of defense for sudden pain. It may reduce fever and pain, but it does not have anti-inflammatory properties.[22]

Non-steroidal anti-inflammatory drugs

Pain, fever, blood clot prevention, and reduced inflammation at therapeutic levels are just some of the many symptoms that can be alleviated by non-steroidal anti-inflammatory drugs (NSAIDs). Some of the most prevalent adverse effects include an increased risk of gastrointestinal ulcers and bleeding, heart attack, and kidney disease.[23] Non-steroidal anti-inflammatory drugs (NSAIDs) are a class of medications with a wide range of therapeutic effects, including pain control, inflammation reduction, fever reduction, and platelet aggregation inhibition. Prostaglandins, prostacyclins, and thromboxane A2 are inflammatory lipid mediators that are reduced in production at the injury site as a result of cyclo-oxygenase inhibition. The intestinal mucosa and the kidney both benefit from these chemical mediators, which have been connected to platelet function.[24]

N-Methyl-D-Aspartate receptor antagonist drugs

Spinal cord neurons become hyper-excitable when they receive continuous, high-intensity pain signals from the periphery. The term "central sensitization" is used to describe the development of an increased pain response to noxious stimuli (hyperalgesia) and an exaggerated pain response to non-noxious stimuli (allodynia).[24] Central desensitization occurs in everyone in response to severe pain, but it appears to be reversed as the injury heals. In some instances, though, the problem still exists. It has been shown that the use of NMDA receptor antagonists such as ketamine or methadone in conjunction with traditional analgesics such as opioids or nonsteroidal anti-inflammatory drugs (NSAIDs) in the perioperative phase decreases either the severity of initial postoperative pain or the amount of analgesics needed.[26]

Anticonvulsants and Antidepressants

In contrast to their efficacy in treating chronic neuropathic pain, anticonvulsants and antidepressants have been shown to be effective in treating acute neuropathic pain, such as that induced by sciatica. Tricyclic amitriptyline is the most widely used antidepressant, and its analgesic effect may be seen after just a few days of treatment with a low dosage.[27] These chemicals influence pain perception by blocking descending inhibitory pathways that are responsible for the absorption of monoamines like norepinephrine and serotonin at nerve terminals. Due to their anticholinergic qualities, TCAs can cause a number of unpleasant side effects, including dry mouth, loss of vision, tachycardia, constipation, and urine retention. Alternatives with a possibly less severe adverse event profile include the SNRIs duloxetine and venlafaxine.[28]

MULTI-MODAL ANALGESIA

The term "multimodal analgesia" describes a method of treating pain pharmacologically that employs multiple types of analgesics. Drug classes that are most frequently combined include local anesthetics, opioids, NSAIDs, acetaminophen, and alpha-2 agonists.[29]

CONCLUSION

Over the last 25 years, neuraxial analgesia approaches have proliferated alongside other modalities as acute pain treatment has gained more attention and been given more time. By combining knowledge of pain's underlying pathophysiology with the many analgesic choices available, a procedure-specific multimodal strategy may be developed, with the goals of providing the most effective pain relief possible while minimizing any negative side effects and improving the overall patient experience.

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