Editorial

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MULTIDISCIPLINARY APPROACH TO CHRONIC PAIN MANAGEMENT

Dr. Balwinder Kaur Rekhi

The current International Association for the Study of Pain (IASP) defines pain as ''an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage''.(1)

This definition recognizes the interplay between the objective, physiological sensory aspects of pain and its subjective, emotional, and psychological components.The response to pain can be highly variable among different individuals as well as in the same person at different times. There are differences related to both gender and age in pain perception, experiences, and coping strategies.
The term nociception is derived from noci (Latin for harm or injury) and is used to describe neural responses to traumatic or noxious stimuli. All nociception produces pain, but not all pain results from nociception. Many patients experience pain in the absence of noxious stimuli. It is therefore clinically useful to divide pain into one of two.
categories: (1) acute pain, which is primarily due to nociception, and (2) chronic pain, which may or may not be due to nociception and in which psychological and behavioral factors often play a major role.

However, Chronic pain persists beyond the usual course of an acute disease or after a reasonable time for healing to occur, typically 1 to 6 months. Chronic pain may be nociceptive, neuropathic, or mixed. Psychological mechanisms or environmental factors, or both, frequently play a major role. Patients with chronic pain often have attenuated or absent neuroendocrine stress responses related to the pain and prominent sleep and mood disturbances. Neuropathic pain is classically paroxysmal and lancinating, has a burning quality, and is associated with hyperpathia-an uncomfortable or painful response to a normally innocuous stimulus. When it is also associated with loss of sensory input (eg, amputation) into the central nervous system, it is termed deafferentation pain. When the sympathetic system plays a major role, it is often termed sympathetically maintained pain.(2)

The most common forms of chronic pain include those associated with musculoskeletal disorders, chronic visceral disorders, lesions of peripheral nerves, nerve roots, or dorsal root ganglia (including diabetic neuropathy, causalgia, phantom limb pain, and postherpetic neuralgia), lesions of the central nervous system (stroke, spinal cord injury, multiple sclerosis), and cancer pain. The pain of most musculoskeletal disorders (eg, rheumatoid arthritis and osteoarthritis) is primarily nociceptive, whereas pain associated with peripheral or central neural disorders is primarily neuropathic. The pain associated with some disorders, such as cancer and chronic back pain (particularly after surgery), is often mixed.(3)

Clinical shreds of evidence lead us to assert that pain can be considered as "biopsychosocial perception" since it mimics a unique individual patient experience with multifactorial genesis. Moreover, it represents a dynamic experience, highly variable in a spatial-temporal manner; thus, it is not imaginable to assume its therapy as universally applicable.Thus, it is necessary to re-think the concept of pain management. Pain treatments need to follow multimodal approaches (pharmacological and nonpharmacological agents)
PHARMACOLOGICAL INTERVENTIONS: includes drug therapy and procedural therapy.

Drug therapy in pain management include acetaminophen, cyclooxygenase (COX) inhibitors, antidepressants, neuroleptic agents, anticonvulsants, corticosteroids, systemic administration of local anesthetics, and opioids.

ACETAMINOPHEN

oral analgesic and antipyretic agent that is also available as an intravenous preparation. It inhibits prostaglandin synthesis but lacks significant anti-inflammatory activity.

Acetaminophen has few side effects but is hepatotoxic at high doses. The recommended adult maximum daily limit is 3000 mg/d, reduced from a previously recommended limit of 4000 mg/d.(4)

Nonsteroidal Anti - inflammatory Drugs (NSAIDs)

NSAIDS inhibit prostaglandin synthesis by inhibiting cyclooxygenase activity.Prostaglandins sensitize and amplify nociceptive input, and blockade of their synthesis results in the analgesic, antipyretic, and anti-inflammatory properties characteristic of NSAIDs. The most common side effects of aspirin (acetylsalicylic acid, ASA) and other NSAIDs are stomach upset, heartburn, nausea, and ulceration of the gastric mucosa. Diclofenac is available as both an oral preparation and a topical gel or patch that may be less likely to contribute to gastric distress. Other side effects of NSAIDs include dizziness, headache, and drowsiness. With the exception of selective COX-2 inhibitors, all COX inhibitors decrease platelet aggregation. (4)

Analgesic	Onset (h)	Dose (mg)	Dosing Interval (h)	Maximum Daily Dosage (mg)
Salicylates				
Acetylsalicylic acid (aspirin)	0.5-1.0	500-1000	4	3600-3600
Diflunisal (Dolobid)	1-2	500-1000	8-12	1500
Choline magnesium trisalicylate (Trilisate)	1-2	500-1000	12	2000-3000
p-Aminophenols				
Acetaminophen (Tylenol, others)	0.5	500-1000	4	1200-4000
Proprionic acids				
Ibuprofen (Motrin, others)	0.5	400	4-6	3200
Naproxen (Naprosyn)	1	250-500	12	1500
Naproxen sodium (Anaprox)	1-2	275-550	6-8	1375
Indoles				
Indomethacin (Indocin)	0.5	25-50	8-12	150-200
Ketorolac (Toradol)	0.5-1	10	4-6	40
COX-2 Inhibitors				
Celecoxib (Celebrex)	3	100-200	12	400

ANTIDEPRESSANTS

Antidepressants are most useful for patients with neuropathic pain and demonstrate an analgesic effect that occurs at a dose lower than that needed for antidepressant activity. Both of these actions are due to blockade of presynaptic reuptake of serotonin, norepinephrine, or both. Older tricyclic agents appear to be more effective analgesics than selective serotonin reuptake inhibitors (SSRIs). Serotonin and norepinephrine reuptake inhibitors (SNRIs) may provide the most favorable balance between analgesic efficacy and side effects. Antidepressants potentiate the action of opioids and frequently help normalize sleep patterns. (5)

Antispasmodics & Muscle Relaxants

Antispasmodics may be helpful for patients with musculoskeletal sprain and pain associated with spasm or contractures. Tizanidine (Zanaflex) is a centrally acting α2- adrenergic agonist used in the treatment of muscle spasm in conditions such as multiple sclerosis, low back pain, and spastic diplegia. Baclofen (Gablofen, Lioresal), a GABAB receptor agonist, is particularly effective in the treatment of muscle spasm associated with multiple sclerosis or spinal cord injury when administered

by continuous intrathecal drug infusion. (5)

Corticosteroids

Glucocorticoids are extensively used in pain management for their anti-inflammatory and possibly analgesic actions. They may be given topically, orally, or parenterally (intravenously, subcutaneously, intraarticularly, or epidurally). (6)

Drug	Routes Given1	Glucocorticoid Activity	Mineralocorticoid Activity	Equivalent Dose (mg)	Half-life (h)
Hydrocortisone	O,I,T	1	1	20	8-12
Prednisone	O	4	0.8	5	12-36
Prednisolone	O,I	4	0.8	5	12-36
Methylprednisolone (Depo-Medrol, Solu-Medrol)	O,I,T	5	0.5	4	12-36
Triamcinolone (Aristocort)	O,I,T	5	0.5	4	12-36
Betamethasone (Celestone)	O,I,T	25	0	0.75	36-72
Dexamethasone (Decadron)	O,I,T	25	0	0.75	36-72

O, Oral; I, injectable; T, topical.
Data from Goodman L.S. Gilman AG, *The Pharmacologic Basis of Theropeutics. 8th ed.* New York, NY : Pergamon, 1990.

Anticonvulsants

Anticonvulsant medications are useful for patients with neuropathic pain, especially trigeminal neuralgia and diabetic neuropathy, because they can suppress the spontaneous neural discharges that play a major role in these disorders. The most commonly utilized agents are phenytoin, carbamazepine, valproic acid, clonazepam, and gabapentin. (7)

Local Anesthetics

Systemic infusion of local anesthetic medication produces sedation and central analgesia and is occasionally used in the treatment of patients with neuropathic pain. Lidocaine and procaine are the most commonly used agents. They are given either as a slow bolus or by continuous infusion. Lidocaine is given by infusion over 5 to 30 min for a total of 1 to 5 mg/kg. Procaine, 200 to 400 mg, can be given intravenously over the course of 1 to 2 h. Monitoring by qualified medical personnel should include electrocardiography, blood pressure, respiration, pulse oximetry, and mental status, and full resuscitation equipment must be immediately available. (7)

α2-Adrenergic Agonists

The primary effect of α2-adrenergic agonists is the activation of descending inhibitory pathways in the spinal cord dorsal horn. Epidural and intrathecal α2-adrenergic agonists are particularly effective in the treatment of neuropathic pain and opioid tolerance. Clonidine (Catapres), a direct-acting α2-adrenergic agonist, is effective as an adjunctive medication in the treatment of severe pain. (7)

OPIOIDS

Opioids are the mainstay of treatment in chronic pain management. Can be given orally as well as parenterally. Parenteral opioids as Intravenous, intraspinal (epidural or intrathecal), or transdermal routes of opioid administration may be utilized when the patient fails to adequately respond to or is unable to tolerate oral regimen. Transdermal fentanyl (Duragesic patch) is an alternative to sustained-release oral morphine and oxycodone preparations, particularly when oral medication is not possible. Currently available patches are constructed as a drug reservoir that is separated from the skin by a microporous rate-

limiting membrane and an adhesive polymer. A very large quantity of fentanyl (10 mg) provides a large force for transdermal diffusion.

PROCEDURAL THERAPY includes Diagnostic & Therapeutic Blocks

Local anesthetic nerve blocks are useful in delineating pain mechanisms, and they play a major role in the management of patients with acute or chronic pain. Pain relief following diagnostic nerve blockade carries favorable prognostic implications for a subsequent therapeutic series of blocks. In selected patients,"permanent" neurolytic nerve blocks may be appropriate. The efficacy of nerve blocks is due to interruption of afferent nociceptive activity, which may be in addition to, or in combination with, blockade of afferent and efferent limbs of abnormal reflex activity involving sympathetic nerve fibers and skeletal muscle innervation. The pain relief frequently outlasts the known pharmacological duration of the agent employed by hours or up to several weeks. The selection of the type of block depends on the location of pain, its presumed mechanism, and the experience and skill of the treating physician. Local anesthetic solutions may be infiltrated locally or injected at specific peripheral nerve, somatic plexus, sympathetic ganglia, or nerve root sites, or they may be administered epidurally or intrathecally.

Radiofrequency Ablation & Cryoneurolysis

Percutaneous radiofrequency ablation (RFA) relies on the heat produced by current flow from an active electrode that is incorporated at the tip of a special needle. The needle is positioned using fluoroscopic guidance. Electrical stimulation (2 Hz for motor responses, 50 Hz for sensory responses) and impedance measurement via the electrode prior to ablation also help confirm correct electrode positioning. Depending on the location of the block, the heating temperature generated at the electrode is precisely controlled (60–90°C for 1–3 min) to ablate the nerve without causing excessive collateral tissue damage. RFA is commonly used for trigeminal rhizotomy and medial branch (facet) rhizotomy. It has also been used for dorsal root rhizotomy and lumbar sympathectomy, and it may be effective for medial branches of the spinal nerves that innervate facet joints. Pain relief is usually limited to 3 to 12 months due to nerve regeneration after RFA. (4)

Neuromodulation

Electrical stimulation of the nervous system can produce analgesia in patients with acute and chronic pain. Current may be applied transcutaneously, epidurally, or by electrodes implanted into the central nervous system.

NON PHARMACOLOGICAL METHODS:

Psychological Interventions Psychological techniques, including cognitive therapy, behavioral therapy, biofeedback, relaxation techniques, and hypnosis, are widely used as part of a multidisciplinary approach to pain control.

Cognitive interventions are based on the assumption that a patient's attitude toward pain can influence the perception of pain. Maladaptive attitudes contribute to suffering and disability. Pain coping skills are taught either individually or in group therapy. The most common techniques include attention diversion and imagery.

Behavioral (operant) therapy is based on the premise that behavior in patients with chronic pain is determined by consequences of the behavior. Positive reinforcers (such as attention from a spouse) tend to enable or intensify the pain, whereas negative reinforcers reduce pain. The therapist's role is to guide behavior modification with the aid of family members and medical providers to nurture negative reinforcers and minimize positive reinforcers.

Relaxation techniques teach the patient to alter the arousal response and the increase in sympathetic tone associated with pain. The most commonly employed technique is a progressive muscle relaxation exercise.

Biofeedback and hypnosis are closely related interventions. All forms of biofeedback are based on the principle that patients can be taught to control involuntary physiological parameters. Once proficient in the technique, The patient may be able

to induce a relaxation response and more effectively apply coping skills to control physiological factors (eg, muscle tension) that worsen pain. The most commonly utilized physiological parameters in biofeedback are muscle tension (electromyographic biofeedback) and temperature (thermal biofeedback). The effectiveness of hypnosis varies considerably among individuals. Hypnotic techniques teach patients to alter pain perception by having them focus on other sensations, localize the pain to another site, and dissociate themselves from a painful experience through imagery. Patients with chronic headaches and musculoskeletal disorders benefit most from these relaxation techniques. (8)

Physical Therapy

Heat and cold can provide pain relief by alleviating muscle spasm. In addition, heat decreases joint stiffness and increases blood flow, and cold vasoconstricts and can reduce tissue edema. The analgesic action of heat and cold may at least partially be explained by the gate theory of pain processing. Superficial heating modalities include conductive (hot packs, paraffin baths, fluidotherapy), convective (hydrotherapy), and radiant (infrared) techniques. Techniques for application of deep heat include ultrasound as well as shortwave and microwave diathermy. These modalities are more effective for pain involving deep joints and muscles. Cold is most effective for pain associated with acute injuries and edema, and it can also relieve muscle spasm. Application may take the form of cold packs, ice massage, or vapocoolant sprays (ethyl chloride or fluoro-methane).

Exercise should be part of any rehabilitation program for chronic pain. A graded exercise program prevents joint stiffness, muscle atrophy, and contractures, all of which can contribute to the patient's pain and functional disabilities (9)

Acupuncture

Acupuncture can be a useful adjunct for patients with chronic pain, particularly that associated with chronic musculoskeletal disorders and headaches. The technique involves the insertion of needles into discrete, anatomically defined points, called meridians. Stimulation of the needle after insertion takes the form of twirling or of application of a mild electrical current. Insertion points appear to be unrelated to the conventional anatomy of the nervous system. Although the scientific literature concerning the mechanism of action and role of acupuncture in pain management is controversial, some studies suggest that acupuncture stimulates the release of endogenous opioids, as its effects can be antagonized by naloxone. (10)

CONCLUSION

All physicians need to understand the rationale, indications, contraindications, and prescription of physical medicine techniques and their appropriate use. Many of these techniques can be used for acute, subacute, and chronic pain. However, with progression to more chronic pain, techniques should be more active and less passive and more behavioral and cognitive in nature. Although many of these techniques will help decrease pain, the long-term goal should be to increase function despite the presence of the pain syndrome. Patients with pain can be evaluated and treated by individual physicians and therapists. This type of approach is more often used and successful in patients with acute or subacute pain. However, as the pain becomes more chronic, a multi disciplinary or interdisciplinary approach is recommended. The role of the therapy team in a pain program should be comprehensive and interdisciplinary. Typically, the team is led by a physician and consists of physical therapists, occupational therapists, and often recreational therapists, dieticians, and psychologists. Combined assessment by these professionals is used to devise a comprehensive approach to allow the patient to benefit maximally, reintegrate fully into life, and have as few restrictions as possible.

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