

# Managing acute pain



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**P**ain is defined as an unpleasant subjective sensation due to a physiologic response to mechanical, thermal or chemical stimuli. The process is mediated by free nerve endings, often from chemicals that are released locally (by direct stimulation or sensitization of nerve endings).

Acute pain is often self-limiting, and there are various methods to improve and control this pain.

The effects of pain are similar in all patients. It affects their performance in many ways as it alters their physiology. A patient suffering from pain has tachycardia, raised blood pressure and increased oxygen consumption. To generate sufficient energy to accommodate the stress response, hormonal

changes, hyperglycemia and catabolic breakdown of proteins and fat occur. If the situation progresses long enough, coagulative problems (eg, deep vein thrombosis, immunosuppression and infections) may develop.

Athletes also experience the biomechanical effects of pain, ie, the development of stress fractures, joints and ligaments, which lead to more pain.

Occasionally, this effect can be quite serious, allowing for increased injury, interrupting sporting activity or, worse still, develop into chronic pain and destroying the athlete's career.

Briefly, the principles of pain management include:

- Education and information. Patient education is important, as patients have interesting ideas and interpretations about the cause and management of their pain.
- Psychological assessment and evaluation. Although more important in chronic pain management, it is still helpful to know the patient's lifestyle, allowing for

the recognition of depression or other pain causes. Potentially beneficial therapies, such as hypnosis, behavioral therapy, relaxation and meditation, can then be applied.

- Prescribing co-analgesics such as NSAIDs, tricyclic antidepressants, anti-convulsants, muscle relaxants and corticosteroids.
- Stimulation techniques, such as acupuncture, ultrasound, massage, transcutaneous electrical nerve stimulation (TENS) and spinal cord stimulation, can be used to control pain in an acute setting.
- Nerve blocks. This technique can be performed easily in the clinic under local anesthetic to block the particular nerve to control the pain, with phenols or with a radio frequency device if the nerve is to be destroyed permanently to stop the pain.
- Ablative neurosurgical techniques such as dorsal rhizotomy, sympathectomy and cordotomy.

## **COX inhibitors in acute pain management**

There are two types of the enzyme cyclooxygenase (COX) in the body: COX-1 (found in all normal cells and tissue) and COX-2 (found only in the brain and kidneys).

When there is an injury, COX-2 will increase at the inflammatory site, producing more prostaglandin and pain. Therefore, to control pain, the enzyme needs to be inhibited. There are three types of COX inhibitors: aspirin, non-selective NSAIDs, and COX-2 selective inhibitors.

## **Aspirin and NSAIDs**

NSAIDs are the big, mainstay armamentarium used in orthopedics. This class of drugs has very useful anti-inflammatory, analgesic and anti-pyretic effects. However, they also have gastrointestinal side effects and interfere with renal vasoregulation via

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the renin-angiotensin system. Thus, care needs to be taken when prescribing NSAIDs to patients with hypertension, renal impairment and hypovolemia.

Examples of NSAIDs include aspirin, diclofenac, ibuprofen, naproxen and indomethacin. However, while all other NSAIDs work by competitively blocking the active site of the enzyme, this effect is reversible to some extent, unlike with aspirin, which inhibits COX irreversibly by covalent acetylation. NSAIDs have low selectivity, and inhibit both COX-1 and COX-2 isoforms. Aspirin inhibits platelets for 10 days, while NSAIDs such as ibuprofen inhibit platelets for 24 hours.

### **COX-2 selective inhibitors**

COX-2 selective inhibitors are the newer group of anti-inflammatory painkillers. Like NSAIDs, they have anti-inflammatory, anti-

pyretic and analgesic effects, but have little effect on the gastrointestinal tract. They cross the blood-brain barrier, thus affecting both the peripheral and central COX-2 receptors which, in turn, allow for better pain control.

Additionally, this new group of drugs eg, celecoxib, etoricoxib and valdecoxib, has no effects on platelets, a useful trait for post-operative pain control as the drugs will not cause more bleeding.

The cost-effectiveness of COX-2 inhibitors is no different from NSAIDs as their higher acquisition cost is balanced out by the higher costs of treating or preventing adverse events with NSAIDs. [*Manag Care Interface* 2003;16(10):38-45; *Gastroenterology* 2003;125:389-95] Furthermore, COX-2 inhibitors are most cost-effective for those at risk for gastrointestinal complications. [*Am J Med* 2001;110(suppl 3A):33S-42S]

### **Other options for acute pain management**

#### *Opioids*

This is the other big group of painkillers. However, they are unable to control inflammation, and have many side effects including respiratory, depression, drowsiness, dizziness, fainting, nausea and vomiting, constipation, tolerance, dependency, itching and broncho-constriction.

#### *Physical measures*

The physical means of preventing pain should not be forgotten as they are also important. These measures, collectively called RICE, involve rest, ice, compression and elevation. RICE is a simple, but effective, way of controlling acute pain.

As a general rule, the injury should be left to rest, iced and elevated (above the level of the heart).

Compression can be useful, but depending on situation, caution is necessary, as too much compression around the swollen area may cause circulation problems. MI



*The simple RICE method can effectively control acute pain.*