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Review Article

MANAGEMENT OF DENTAL PAIN – A REVIEW

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ABSTRACT

The word "pain" is derived from a Greek word "poine" meaning penalty. Pain, thus is an unpleasant emotional experience that usually accompanies nociception. Nociception refers to signals arriving in the central nervous system resulting from activation of specialized sensory receptors called nociceptors, which provides information about tissue damage. Dental pain is caused due to pathological changes occurring in dental hard and soft tissues. Managing acute postoperative pain is inherent to dental practice. This article provides a brief review of the drugs used for the management of postoperative dental pain.

INTRODUCTION

Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage [1]. In medical diagnosis, pain is a symptom. Pain can be of two types: Acute pain and chronic pain [2]. Primary afferent sensory nerve fibres with cell bodies in the dorsal root ganglia innervate all tissues of the body [3]. Among the small myelinated (Aδ) and the unmyelinated (C) sensory fibres are those that respond selectively to noxious or potentially damaging stimuli, which are called nociceptors. The receptive elements are free nerve endings [4]. The Aδ nociceptors (which innervate a spot-like receptive field) in the skin may respond only to noxious mechanical stimuli (e.g. pinch) or to both noxious mechanical and heat stimuli [5]. Some C-fibre receptors are similarly sub-modality selective, whereas others are responsive to several forms of noxious mechanical, thermal and chemical stimulation [6]. Pain can be caused due to injury trauma in general. Dental pain can be caused due to pulpal inflammation, gingival disease etc. This article briefs out the dental origin of pain and various methods of managing the same.

Causes of orofacial Pain: *(1)*

- Local disease
  - Odontogenic pain
- Neurological disorders
  - Idiopathic trigeminal neuralgia
  - Malignant neoplasms involving the trigeminal nerve
  - Gloss pharyngeal neuralgia
  - Herpes zoster (including post herpetic neuralgia).
- Psychogenic causes
  - Atypical facial pain
  - Burning mouth syndrome
  - Temperomandibular- pain-dysfunction
- Vascular disorders
  - Migraine
  - Migrainous neuralgia
  - Giant cell arteritis
- Referred pain
  - Nasopharyngeal
  - Ocular
  - Aural
  - Cardio respiratory
  - Angina
  - Lesions in the neck or chest

Causes of dental pain

Dental pain can be caused due to (2),

- Disease of dental hard tissues
  - Caries involving dentin
  - Caries of cementum
- Disease of dental soft tissues
  - Caries involving the pulp
  - Gingivitis
  - Periodontitis

Dental pulpitis

Pulpitis occurs as a result of progression of dental caries into the pulp. Typically characterized by a throbbing pain which tends to radiate or refer to the ipsilateral ear, temple and cheek,

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but does not cross the midline. It is exacerbated by temperature changes and pressure on a carious lesion. Pain aggravates during the night time.

Premature contact

Premature contact occurs due to a recent tooth restoration that is highly placed compared to the normal occlusion. Characterized by a sharp (dull after a period) pain.

Pericoronitis

Infected tissue usually associated with an impacted or erupting lower third molar (wisdom) tooth.

Periodontal Abscess

Pain is associated with periapical inflammation that is spontaneous in onset.

Causes moderate to severe pain. The affected tooth is sensitive to percussion and pulp is usually vital.

Periapical Periodontitis

Pain is associated with acute periapical inflammation. Persists for a longer duration. It exacerbated during occlusion. It is spontaneous in onset and is usually associated with a non-vital tooth.

Food *impaction*

Food impaction interdentally causes Localized pain that develops between teeth. Pain is associated with a feeling of pressure and discomfort. The adjacent teeth will be sensitive to percussion.

Cracked/ fractured tooth

Fractured tooth due to trauma or any other reason causes severe pain which aggravates on pressure and percussion.

Acute necrotising gingivitis

Acute necrotising gingivitis causes profuse gingival bleeding, Soreness and pain at the gingival margin. Halitosis, fever and Metallic taste is some of the other features.

Alveolar osteitis

It is also called as dry socket. It occurs several days after tooth extraction due to the mechanical loss of the blood clot in the socket or salivary based enzymic (fibrinolytic) factors. Patient reports with severe ache in the extracted socket.

Post endodontic treatment pain

Severe aching pain following endodontic treatment occurs very commonly which improves over time.

Pain Fibres

Nociceptors are high-threshold specialized sensory receptors of the peripheral somatosensory nervous system that is capable of transducing and encoding noxious stimuli. They are the free nerve endings that are distributed throughout the body. These nociceptors can be stimulated by mechanical, thermal or chemical stimuli. Primary afferent fibres of nociceptors are Aδ, Aβ and C fibres. Noxious stimuli are carried by the Aδ and C fibres whereas non noxious stimuli are carried by the Aβ fibres (3).

Aδ fibres	C fibres	Aβ fibres
• Lightly myelinated • Smaller diameter • Slowly signal conduction • Conduction velocity is 5-15ms-1 • Responds to acute pain	• Unmyelinated • Smallest type • Slowest conduction • Conduction velocity is < 2ms-1 • Responding to chemical, mechanical and Thermal stimuli	• Highly myelinated • Large diameter • Rapid signal conduction • Conduction velocity is > 40 ms-1 • Respond to light touch and transmit non noxious Stimuli

Chart 1 Afferent Pain Pathway

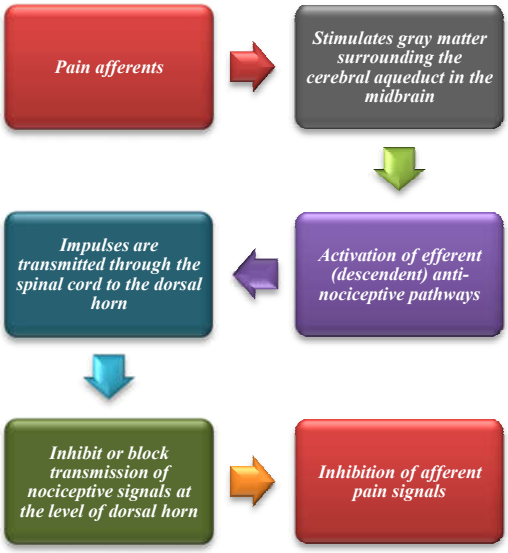


Chart 2 Efferent Pain Pathway

Management of Dental Pain

The '3-D's' principle should be used for managing pain in dental practice (4).

The '3-D's' to be followed are:

1. Diagnosis
2. Dental treatment and

3. Drugs

Diagnosis

The first, and most important, step for managing dental pain is to diagnose the disease or condition causing the pain. The information is obtained thorough the medical and dental histories, discussing the presenting problem with the patient, and clinical examination guides in proper diagnosis. The history and discussions enables the clinician to give a provisional diagnosis, whereas the clinical examination and diagnostic procedures leads to a final diagnosis The diagnostic process requires a very thorough knowledge of the clinician about the various diseases and conditions that may affect the oral and dental tissues and the oral manifestation of systemic diseases (5).

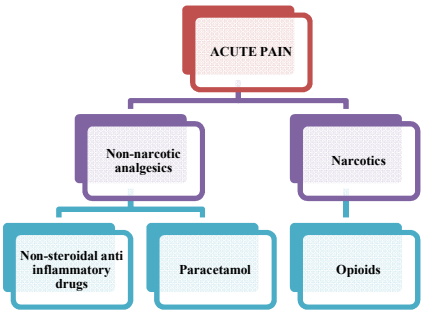
Dental treatment

Once the diagnosis of the disease causing the pain has been established, an appropriate dental treatment should be given. The drugs should only be used as an adjunct to the dental treatment (6).

Table 1 Management of various dental diseases

Dental diseases	Dental management
Dental caries without pulpal involvement	Removal of caries followed by appropriate restoration
Reversible/ irreversible pulpal involvement	Endodontic management or extraction
Dental sensitivity	Brushing technique, varnish application, topical fluoride
Premature contact	High points must be detected and reduced
Cracked tooth	Depending on the location may need extraction or endodontic treatment
Periodontal disorders	Depending on the extent of lesion may need extraction or periodontal surgical correction
Pericoronitis	Debridement, hot salt mouthwashes, antibiotics and extraction of upper wisdom tooth
Alveolar osteitis (dry socket)	Irrigation of the socket. Antibiotic metronidazole

Drugs



NSAID

Clinical trials have shown that, NSAIDs are effective for the management of any level of dental pain, whether mild, moderate or severe. NSAIDs block the cyclooxygenase enzymes, which exist in 2 forms known as cyclooxygenase-1 (COX-1) and cyclooxygenase-2 (COX-2). COX-1 is responsible for the synthesis of several mediators, including the prostaglandins that protect the gastric mucosa and initiate platelet aggregation. Tissue damage such as pulpitis or periodontitis, or tissue damage resulting from surgery, will induce the production of COX-2, which, in turn, leads to the synthesis of the prostaglandins that sensitize pain fibres and promote inflammation(7). Traditional NSAIDs block both COX-1 and COX-2, but in recent years, Selective COX-2 inhibitors were developed to be less damaging to the gastric mucosa (8). Therapeutic effects of NSAIDs include Analgesic effect, Anti-inflammatory, Antipyretic, Antidysmenorrheal and Antiplatelet action. NSAIDs are contraindicated in Gastric ulcers or gastrointestinal inflammatory disease, NSAID-induced hypersensitivity, in third-trimester pregnancy, presence of significant renal disease and concurrent use of antihypertensives such as angiotensin-converting enzyme inhibitors, diuretics or beta-blockers and anticoagulants (warfarin).

Paracetamol

Paracetamol (also known as acetaminophen) acts primarily in the central nervous system (CNS). Neither the site nor the mechanisms of action have been clearly established (9). It has analgesic and anti-pyretic effects, and it is a weak inhibitor of COX-1 and COX-2. Paracetamol readily crosses the cerebrospinal fluid and works by inhibiting prostaglandin synthesis in the hypothalamus. It can be used for managing mild to moderate dental pain. It can also be in combination with NSAIDs.

Opioids

Opioids can be used to manage severe dental pain where acetaminophen or NSAID alone is insufficient (10). Therapeutic effects include analgesia, antitussive and sedation. It also causes mood alteration (euphoria/dysphoria), respiratory depression, tolerance and physical dependence in long term and has addiction potential. Opioids are contraindicated in severe chronic respiratory disease, severe inflammatory bowel disease and Concurrent use of alcohol. Prescribing opioids for dental pain should be considered only in combination with an NSAID or acetaminophen. Codeine should be the first to be prescribed. If codeine is insufficient, Oxycodone is considered. Meperidine, a synthetic opioid, should be reserved for the patient who is allergic to morphine and codeine derivatives, but who still requires an opioid.

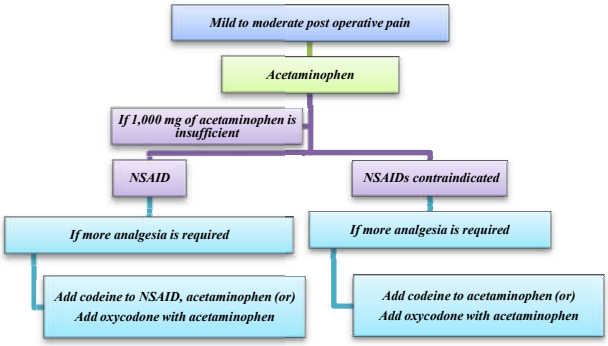


Chart 3 Flowchart depicting the pharmacological management of post operative pain

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