

ANALGESICS IN DENTISTRY- A REVIEW

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ABSTRACT: Management of pain is critical and challenging in dentistry. Pain is a major postoperative symptom in many dental surgical procedures. For prevention and therapy of pain, many drugs are available belonging to many different active component classes (e.g., anesthetics, local anesthetics, and antidepressants). There are a variety of analgesics and techniques to treat dental pain. The recent focus and publicity on the adverse effects of analgesics, in particular, Nonsteroidal anti-inflammatory Drugs, makes selection of analgesics for pain management important both clinically and legally. The treatment of odontogenic pain is focused not only in the relief of pain but also in the suppression of causes of pain, mainly inflammation. Acting as inhibitors of pain mechanism, analgesics are used for symptomatic treatment of pain. This review provides evidence on the use of analgesics in dentistry with the aim of helping dentists select the most appropriate analgesic and technique for their patients.

Keywords: Analgesic, Dental, Acetaminophen, Treatment, NSAIDs

INTRODUCTION

Although these drugs are safe, recent studies alert to intoxication risk and severe adverse effects, even at doses or concentrations nearly the same as those used to relieve pain, increasing the need for either pharmacological knowledge or patient guidance [1]. The clinician should employ a variety of effective and safe analgesic regimens based on estimates of anticipated pain intensity, mechanism of action and toxicity[2]. Traditional NSAIDs, such as aspirin, act by blocking both cyclooxygenase enzymes (COX-1 and COX-2). This nonselective inhibition is responsible for many of the unwanted effects of this drug [3]. Aspirin, like all the other NSAIDs, induce inhibition of thromboxane synthesis resulting in a decrease in the platelet aggregation. For most NSAIDs this effect is reversible within 24 hours. However, aspirin is unique in that it irreversibly damages cyclooxygenase for the life of the platelet [4]. The treatment of pain in children and elderly patients is associated with some limitations accompanied with safety concerns and dose reduction.

PAIN MECHANISMS UNDERLYING ANALGESIC EFICACY

Pain can be classified as acute or chronic. Acute pain is usually of short duration and the cause often identifiable (disease, trauma). Chronic pain persists after healing is expected to be complete, or is caused by a chronic disease. Pain may be modified by psychological factors and attention to this is essential in pain management. Drug treatment aims to modify the peripheral and central mechanisms involved in the development of pain. Oral tissue injury activates the inflammatory process, which releases a large series of pain mediators. Mediators such as prostaglandins and bradykinins cause increased sensitivity and excitation of peripheral nociceptors, which usually have little spontaneous activity under normal conditions increased responsiveness of neurons in the central nervous system and to central sensitization, which is responsible for the prolonged pain after dental surgery. The concept of pre-emptive analgesia (analgesic intervention before nociception) is particularly useful because it can potentially prevent the induction of central sensitization by blocking the arrival of nociceptive input to the central nervous system and can prevent peripheral sensitization by preventing the formation of pain mediators in the injured tissues [5].

CLASSIFICATION OF ANALGESICS

Analgesic drugs are classified as:

- ✓ Opioid analgesics (narcotics)
 - Natural opium alkaloids
 - Morphine
 - codeine
 - Semisynthetic opioids
 - Diacetylmorphine
 - Oxymorhone
 - Pholcodeine

- Synthetic opioids
 - Pethidine
 - Fentanyl
 - Methadone
 - Dextropropoxyphene
 - Ethoheptazine
 - Tramadol
- ✓ Non opioid analgesics (Non-narcotics) and NSAIDs
 - a. Non-selective COX inhibitors
 - Salicylates
 - Aspirin, salicylamide, benorylate, diflunisal
 - Pyrazolone derivatives
 - Phenyl butazone, oxyphenyl butazone
 - Propionic acid derivatives
 - Ibuprofen, naproxen, ketoprofen, fenoprofen, flubiprofen, oxaprozin
 - Indole derivatives
 - Indomethacin, sulindac
 - Anthranilic acid derivatives
 - Mefenamic acid, flufenamic acid
 - Aryl acetic acid derivatives
 - Diclofenac, tolmetin
 - Oxicam derivatives
 - Piroxicam, tenoxicam
 - Pyrrolizine carboxylic acid derivative
 - Ketorolac
 - b. Preferential COX-2 inhibitors
 - Nimesulide
 - Meloxicam
 - Nabumetone
 - c. Selective COX-2 inhibitors
 - Valdecoxib
 - Celecoxib
 - Rofecoxib
 - d. Analgesics with poor anti inflammatory action
 - Paraminophenol derivative- Paracetamol
 - Pyrazolone derivative- Metamizol, prophenazone
 - Benzoxazocine derivative- Nefopam

GENERAL GUIDELINES FOR THE USE OF ANALGESICS

Eliminate the source of pain, if at all possible individualize regimens based on pain severity and medical history, Maximize the Non opioid before adding an opioid optimize dose and frequency before switching For NSAIDs, consider preoperative dose and loading dose. Avoid chronic use of any analgesic whenever possible and reduce the dose and duration of any NSAIDs or opioid in the elderly [6].

ANALGESICS IN DENTISTRY

The most common analgesics used in dentistry are Acetaminophen, aspirin, diclofenac, tramadol and diclofenac in combination with acetaminophen. Topical formulation are available for application over painful joints and muscle. Various preparation are available like diclonac gel, voveron emulgel, dolonex gel, etc.

Indications of analgesics in dentistry are irreversible pulpitis, apical periodontitis, acute alveolar abscess, sinusitis, after extraction, drysocket, lichen planus and for recurrent aphthous ulcer. Analgesic choice is also determined by the type of pain like neuropathic pain, traditional analgesics are less effective, and there is often benefit from classes of drugs that are not normally considered analgesics, such as tricyclic antidepressants and anticonvulsants.

EFFICACY OF ANALGESICS FOR DENTAL PAIN

Drug that selectively relieves pain by acting in CNS or on peripheral pain mechanism, without significantly altering consciousness. Many of the analgesics tested for pain management were tested using the dental model and hence there is a wealth of

information available for the efficacy of analgesics for dental pain. Orofacial pain may be nociceptive pain (tissue injury) or neuropathic pain (dysfunction of nervous system). It is clear that Nonsteroidal anti-inflammatory drugs, including traditional NSAIDs and cyclooxygenase-2 inhibitors, do extremely well in this single-dose comparison, but they do differ in efficacy. At therapeutic doses, all NSAIDs have number-needed-to-treat values of between 1.6 and 3, and the point estimate of the mean is below that of (i.e. better than) 10 mg intramuscular morphine (number-needed-to-treat 2.9), even though the confidence intervals overlap.

ADVERSE EFFECTS AND CONTRAINDICATIONS OF ANALGESICS

Dentists need to know the likelihood of adverse effects of analgesics to assess the efficacy and risk ratio. This applies to both serious clinical effects that may cause significant morbidity or mortality, and to more trivial symptoms that may affect quality of life and drug compliance.

NON-OPIOID ANALGESICS

Non-opioid analgesics with anti-inflammatory activity include salicylates such as acetylsalicylic acid and other NSAIDs such as ibuprofen. Non-opioid analgesics with little or no anti-inflammatory activity include paracetamol. Non-steroidal anti-inflammatory drugs are associated with a number of side effects. The most common side effects are dyspepsia, gastric mucosal damage, increased bleeding, possible renal impairment, anaphylactoid reactions, nausea, vomiting, diarrhea, dizziness, and headache. The serious side effects include prolonged bleeding after surgery, kidney failure, and gastrointestinal and cardiovascular adverse effects. Contraindications are Gastric ulcers or gastrointestinal inflammatory disease or other NSAIDs induced hypersensitivity and nasal polyps Concurrent use of the following drugs: antihypertensives such as angiotensin-converting enzyme inhibitors, diuretics or beta-blockers: NSAIDs may be co-prescribed if required for 4 days or less lithium anticoagulants (warfarin) antineoplastic doses of methotrexate alcohol digoxin if patient is elderly or has renal disease other NSAIDs or acetaminophen; long term oral hypoglycemic. Generally, acetaminophen has a safer profile than non-steroidal anti-inflammatory drugs. A recent meta-analysis of 47 randomized controlled trials that enrolled 4186 patients using single-dose acetaminophen for postoperative pain shows no statistically significant differences in the frequency of reported adverse effects between acetaminophen and placebo [7]. However, acetaminophen overdose can cause hepatotoxicity [8]. Severe hepatotoxicity has been reported even after therapeutic doses in patients with risk factors such as chronic alcohol consumption, human immunodeficiency virus infection, and hepatitis C virus infection [9]. Hence, rational prescribing is equally important for a safe analgesic like acetaminophen.

OPIOID ANALGESICS

Opioids work by binding to receptors on cells mainly in the brain, spinal cord and gastrointestinal system. Morphine is effective in relieving moderate to severe pain, particularly of visceral origin; there is a large variation in patient response. Weaker opioids such as codeine are suitable for mild to moderate pain. Codeine is an opioid analgesic much less potent than morphine and much less liable, in normal doses, to produce adverse effects including dependency. It is effective for mild to moderate pain but is too constipating for long-term use. Effects include Analgesia, Antitussive, Sedation, Contraindications include Severe chronic respiratory disease and Severe inflammatory bowel disease. Two recent meta-analyses for the adverse effects of opioids in pain management showed that about onethird of patients abandoned treatment because of adverse events[10]. Dry mouth (affecting 25% of patients), nausea (21%), and constipation (15%) were most common [11]. Another meta-analysis of analgesics for dental pain shows that codeine and codeine combinations were associated with a significant increase in patients suffering adverse events compared with non-steroidal anti-inflammatory drugs alone [12]. The frequency of adverse events with opioids is more common than with non-steroidal anti-inflammatory drugs and acetaminophen, making them a poor choice for dental pain. In view of the frequency of adverse effects, softening laxatives and anti-emetics (e.g. metoclopramide) should be made available at the same time when required for opioid prescriptions.

An evidence-based update of the use of analgesics in dentistry is proposed by Cliff. Participation by a fully informed patient in the decision-making process is an essential element of good dental practice. Postoperative pain following dental procedures should decrease over the course of 3–5 days as the inflammatory process subsides. The presence of persistent pain even after continuous analgesic therapy should be evaluated to determine the cause of the pain, e.g. infection or misdiagnosis, and treated on the basis of the diagnosis [13]. Opioids are employed in treatment of moderate to severe dental pain. They are used along with NSAIDs or paracetamol. They should never be used alone for the treatment of dental pain which is of an inflammatory nature as these drugs are not anti-inflammatory drugs. Opioids should only be used for the shortest duration of 3 days or less, only after the use of NSAIDs and/or acetaminophen is optimized [14]. Opioids should best be avoided in the alcoholic patient considering the complex and multifactorial relationship that may be present with alcohol and opioid abuse.[15] Analgesics and especially NSAIDs are the second most frequently prescribed drugs by dentists but the type of NSAIDs prescription varies among dentists in different part of the world [16].

CONCLUSION

Pain in teeth is the most common form of pain in the orofacial region. Analgesics are frequently used in dentistry for the management of dental pain. Dental clinicians should choose the medicine based on its mechanism of action and toxicity, to promote a successful analgesic effect as well as comfort to the patient. Selecting the most appropriate analgesic is an issue of efficacy, safety, and cost. No analgesic, dose, or combination will work for all patients. Rather, the dentist has to periodically assess patients pain and intervene as needed to adjust medications to balance analgesic efficacy against adverse effects. Rational prescribing will result in good pain management with minimal side effects. Hence dentists should be familiar and attentive to these drug interactions and understand the basis on which they occur, in order to estimate the risk posed by analgesic administration to patients who are already on medication for other diseases.

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