

Review Article

Pharmacotherapy in dental pain: a review

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ABSTRACT

Orofacial pain is the most important factor that must be fully controlled in dental practice; Poor pain management at the first level of care can have consequences for the patient such as worry, discomfort, fatigue, lack of appetite and alterations in their systemic health. It is therefore essential to provide a practical and easily accessible therapy in the dental office. as is pharmacotherapy. Non-steroidal anti-inflammatory analgesics are the drugs mostly used to control postoperative pain after dental treatments, and the use of analgesics for prolonged periods or a combination of these to achieve success in controlling dental pain is uncommon.

Keywords: Dental pain, Pharmacotherapy, Analgesics, Non-steroidal anti-inflammatory drugs

INTRODUCTION

Pain is the most common symptom of many dental conditions and is a cardinal sign of an inflammatory process.¹ When there is inadequate pain control at the first level of care, it can have consequences for the patient such as worry, discomfort, fatigue, lack of appetite and even alterations in their systemic health.² The oral health professional must have the ability to eliminate or minimize pain with practical measures that allow the patient easy access and also minimize the risk of adverse effects. Defining pain has always been a challenge due to different perceptions that can be had about it, and until today there are different definitions which are valid, one of them is the one described by the Royal Spanish academy which to define pain was based in its Latin etymology (*dolor-oris*) and defined pain as "an annoying and afflictive sensation in a part of the body with an internal or external cause."³ However the most accepted definition until today was described by the world

association for pain. Pain study, which defined pain as "an unpleasant sensory and emotional experience associated with actual or potential tissue damage, or described in terms of such damage."⁴

NEUROPHYSIOLOGY OF PAIN

The buccofacial region is the area with the greatest sensory innervation in our organism, whose nerve fibers are located near different cutaneous and mucosal surfaces that are inert to different traumas to which the organism can induce an episode of pain.⁵

The orofacial sensory pathway is composed of several key components (Figure 1) that act in the peripheral and central transmission of painful stimuli: Peripheral receptor (nociceptor): Nociceptors are specialized receptors on the surface of tissues that detect painful stimuli and transmit signals through the nervous system. Peripheral sensory ganglion: The first neuron receives

signals from the nociceptor and transmits them through the peripheral sensory ganglion, a group of nerve cells located near the site of stimulation. Encephalic isthmus: The second neuron receives signals from the first neuron and transmits them to the brain through the encephalic isthmus, a critical region that connects the brainstem to the cerebrum. Thalamus: The thalamus is a brain structure that processes and analyzes sensory signals, including those related to pain. The third nerve cell receives signals from the second nerve cell and sends them to the brain for processing. Cortical projection: Finally, pain signals are processed in the cerebral cortex, where they are integrated with other sensory and emotional signals to create the subjective perception of pain.^{7,6}

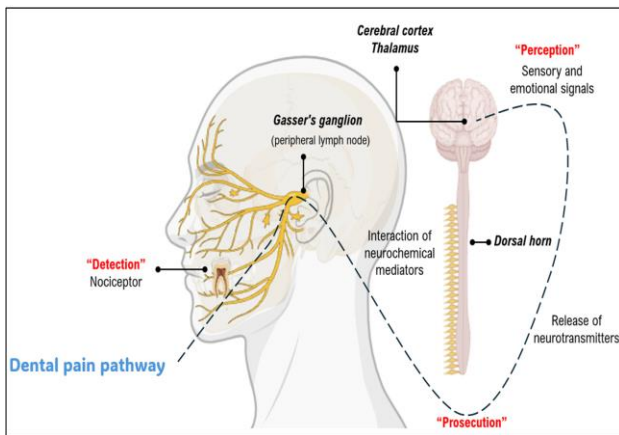


Figure 1: Representation of the sensitivity pathway in the orofacial region.

PAIN MODULATION

Pain modulation is a complex process that can occur at both the peripheral and central nervous system levels. For such modulation to occur, noxious stimuli must be detected peripherally, signals must be transmitted to the central nervous system through specific pathways such as the trigeminal nerve, and these signals must be processed at multiple levels of the central nervous system to produce the conscious perception of pain.^{6,8}

CLASSIFICATION OF DENTAL PAIN

The generalized classification of orofacial pain is established in two groups and they are grouped according to their origin-somatic orofacial pain and neurogenic orofacial pain.

Somatic orofacial pain is that which corresponds its activity to different inflammatory pathologies (traumatic, tumor, degenerative, etc.) in different origins such as skin, muscles, joints, ligaments or bones. On the other hand, orofacial neurogenic pain includes vascular pain, neuralgia, etc.⁸⁻¹⁰

Dental pain can be classified according to the structures involved (Table 1).

Table 1: Types of dental pain in relation to the structures involved.

| Variables | Structures involved |
|----------------------------|-------------------------------|
| Pain of dental origin | Dentin pain |
| | Pain of periradicular tissues |
| | Pulpal pain |
| Pain of periodontal origin | Periodontitis |
| | Acute periodontal abscess |
| | Necrotizing gingivitis |
| | Pericoronitis |
| Dental surgery | Surgical treatments |

PAIN MANAGEMENT IN DENTISTRY

One of the most common problems in clinical practice that the dentist most frequently faces is the fear of pain that the patient reports in the consultation.^{11,12} The presence of pain is perhaps the most common reason for a scheduled visit to the dentist. and most general dentists will probably see at least one or two patients in pain almost every business day. Current medicine has a very wide variety of medications for pain management; Therefore, achieving effective and safe control of that pain is an essential part of daily dental practice. Therefore, dentists must be able to diagnose the origin and nature of pain and must be familiar with strategies for the treatment of dental, oral, facial, and postoperative pain. The drugs of first choice for the treatment of pain and inflammation are non-steroidal anti-inflammatory drugs (NSAIDs) in some cases opioids or neuromodulators such as those listed below:¹³

Acetaminophen

Also known as paracetamol, due to its analgesic and antipyretic effects, it is a drug of first choice in the therapeutic management of fever and pain. Its usefulness has been enhanced in the treatment of postoperative dental pain, which is why it is considered the drug of choice for pain therapy and in patients with acute herpetic gingivostomatitis. Its use in dentistry is recommended for short periods of time, not exceeding 10 days, because in this range of use it has not presented collateral effects. The presentations in which it can be found are tablets or suppositories. The suggested dose in children is: 10 mg/kg/6-8 h, PO or RV; and for adults: 500 to 1000 mg every 6-8 hours, PO or RV, maximum 4 gm per day.^{14,16}

Acetylsalicylic acid

Its analgesic effects have been enhanced in the treatment of headaches, neuralgias or myalgias. Its analgesic effect is for the relief of mild to moderate pain due to its analgesic therapy offered for 1-2 hours.

It is considered the most effective analgesic for acute pain therapy; however, due to the adverse effects it can cause, its prescription has been limited. Odontologically, it is recommended for the treatment of acute inflammatory processes and for analgesic therapy of temporomandibular joint disorders in adults.

It is important to take into account the considerations that should be taken into account in the administration of acetylsalicylic acid (ASA) due to the adverse effects it can cause, which is why the use of this drug should be limited in patients with: hyperuricemia or gouty arthritis, nephropathy, heart failure, the elderly and in patients on anticoagulant treatment.

The suggested dose in children is: 65 mg/kg/d administered at intervals of 6-8 hours PO. And for adults: 325-650/4 h, PO, maximum 4 gm per day.^{15,16}

Diflunisal

Salicylate with analgesic and anti-inflammatory effects, its maximum therapeutic effect is reached 2-3 h after ingestion, and one of its advantages is the longer therapeutic duration compared to SSA. Its safest administration is oral, but it should be limited in patients with nephropathies, cardiopathies, allergic to SSA or susceptible elderly.

The suggested dose in adults is 1000 mg initial dose followed by 500 mg/12 h, POV; maximum maintenance dose: 1,500 mg/day.

Salsalato

Salicylate with prolonged anti-inflammatory and analgesic action in the relief of moderate pain. Its action is ideal for the treatment of arthralgias and one of the advantages over SSA is the minor inhibitory effect on platelets.

The suggested dose in adults is: 500 mg/8 h, POV.^{1,17}

Ibuprofen

The use of this drug has been highly studied and it is considered the NSAID of choice due to its rapid analgesic effect and its effective anti-inflammatory therapy, its use in dentistry is recommended par excellence in most dental treatments. Indicated in preoperative therapy, although its use in the postoperative period has become more efficient due to its analgesic and anti-inflammatory effects, relieving mild to moderate pain without antipyretic effects. Its combination with salicylates is not recommended because there is no potentiation of effects, but an increase in toxicity. Its use is not prohibited in children, although its administration is recommended in children over 12 years of age. The suggested dose in children is: 20 to 30mg/kg body

weight, divided into 3 or 4 doses during the day, POV; and for adults 400-600 mg c/6-8 h, POV.^{14,15,18}

Ketoprofen

It is an NSAID with analgesic and antipyretic properties, and its use has been increased after surgical treatment because its action relieves moderate pain. The suggested dose in adults is 50 mg/6-8 h, POV. It is recommended 150 mg per day and increase the dose according to response and as maximum dose 200 mg per day.^{1,15,19}

Indomethacin

It is a drug with high anti-inflammatory capacity with little dental use, although its effectiveness in suppressing gingival inflammation and alveolar bone resorption has been reported. Its use is indicated as a preoperative medication for post-traumatic inflammatory reduction. It is also indicated for the relief of inflammation associated with moderate or severe pain. It is important to note that it should be administered for its anti-inflammatory effects and not for its analgesic effects. It should be avoided in pregnant patients, with gastrointestinal disorders because it generates greater intolerance than paracetamol. The side effects it may cause are dizziness, tinnitus, sodium and water retention. The suggested dose in adults is: 25-50 mg/8-12 h, POV; as a maximum dose 200 mg per day.^{8,20}

Diclofenac

It is a very useful NSAID for fast relief of moderate pain, for adult use only. Scientific evidence shows its inhibitory activity on the enzyme phospholipase A2, which explains its high analgesic and anti-inflammatory activity. It has a greater analgesic effect than ibuprofen. It is indicated for prophylactic administration during the first 24 hours of the postoperative period after dental surgery because it is rapidly absorbed after oral administration. The suggested dose in adults is 50 mg/8 h, POV; as a maximum dose 150 mg per day.^{14,21}

Naproxen

Its analgesic and anti-inflammatory action has a longer duration and stronger anti-inflammatory effect compared with ibuprofen; however, despite its advantages over ibuprofen, it has a higher risk of adverse effects such as gastrointestinal toxicity. Therefore, its use should be reserved for pain not relieved by ibuprofen or considered as a second therapeutic option. The suggested dose in children is: 5 mg/kg c/8-12 h, POV; and in adults: 550 mg initial and 275 mg/every 6-8 h, POV, for a maximum dose of 1100 mg per day.^{4,22}

Celecoxib

The use of celecoxib in dentistry is limited due to lack of knowledge about its use; it is an NSAID with analgesic

effect in mild to moderate pain, it is indicated for referred pain after surgical treatment, or as pharmacological therapy for the treatment of alveolitis. The suggested dose in adults is 100 mg/every 12 hours, OUV, with a maximum dose of 400 mg per day.²²

Tramadol

Centrally acting drug without anti-inflammatory effects. Tramadol is not used as a routine alternative for the management of dental pain; its use is limited mainly to patients allergic to non-steroidal anti-inflammatory drugs or as an adjuvant in the management of severe odontogenic pain. Its administration is recommended to be combined with antiemetics because some of its most common side effects are vomiting, dizziness and nausea. It is also recommended to limit its use in patients with asthma or respiratory depression.

The suggested dose in adults is 50-100 mg/every 6-8 hours, POV, with a maximum dose of the 400 mg per day.²¹

Methocarbamol

Muscle relaxant of central action with inhibition of polysynaptic reflexes; its use in dentistry is limited to the treatment of muscle pain and usually in combination with some NSAID. The suggested dose in adults is 500 mg/every 8 hours, POV; the maximum recommended dose is 8 gm per day for the first 48-72 hours.^{4,14}

Pregabalin

Pregabalin is a drug approved for the treatment of diabetic peripheral neuropathy, fibromyalgia and as an adjuvant in the treatment of epileptic patients. However, another of its indications is in the use of neuropathic pain and anxiety disorders. In dentistry, its use has been related to the treatment of fibromyalgia, acute pain and post-operative pain. The suggested dose in children over 12 years of age for the treatment of fibromyalgia is 37.5 mg/every 12 hours, POV, for 1 week. Increase the dose according to response up to 150-450 mg/day in 2 divided doses; maximum daily dose is 450 mg per day. Suggested adult dose is 50-75 mg/every 24 hours, POV, 1-3 hours before bedtime; increase dose gradually every 7 days to effective daily dose of 150-450 mg/day. Suggested dose for treatment of postoperative pain is 75-300 mg as a single dose, POV, 1-2 hours before surgery.^{21, 19}

Gabapentin

Gabapentin reduces the release into the synaptic space of certain excitatory neurotransmitters involved in nociceptive transmission. Although its main indication is as an anticonvulsant, the usefulness of gabapentin in the treatment of neuropathic pain and pain associated with inflammatory processes has been documented. Likewise, its use is indicated as a therapy for chronic pain of the masticatory muscles. Dosage for neuropathic pain is gradual, as initial dose: 5 mg/kg at bedtime; second day: 5 mg/kg/12 h; third day: 5 mg/kg/8 h titrate effect. Usual dose: 8-35 mg/kg/day, divided into 3 doses (Table 2).^{14,20}

Table 2: Drugs of first choice for pain management.

| Classification of analgesics | Drug | Recommended dosage | | Mechanism of action | Side effects |
|------------------------------|---------------------------|--|--|---------------------|-------------------------------------|
| | | Children | Adult | | |
| Antipyretics | Acetaminophen | 10 mg/kg/6-8 h | 500-1000 mg/6-8 h | OR or RR | Hepatotoxicity, hypoglycemia skin |
| Anti-inflammatories | Acid acetylsalicylic acid | 65 mg/kg/6-8 h | 325-650 mg/6-8 h | OR | Rashes hemorrhages |
| | Diflunisal | | 500 mg/12 h | OR | Vomiting, constipation |
| | Salsalate | | 500 mg/8 h | OR | Vertigo |
| NSAIDs | Ibuprofen | 20-30 mg/kg/6-8 h | 400-600 mg/6-8 h | OR | Tinnitus, glomerulonephritis |
| | Ketoprofen | | 50 mg/6-8 h | OR | Drowsiness |
| | Indomethacin | | 25-50 mg/8-12 h | OR | Gastrolesive |
| | Diclofenac | | 50 mg/8 h | OR | Dyspepsia, hepatotoxicity |
| | Naproxen | 5 mg/kg/8-12 h | 550 mg/6-8 h | OR | Tinnitus, heart failure |
| | Celecoxib | | 100 mg/12 h | OR | Constipation, dysgeusia |
| Opioids | Tramadol | | 50-100 mg/6-8 h | OR | Vomiting, nausea, vertigo |
| | Methocarbamol | | 500 mg/8 h | OR | Hot flashes, insomnia |
| Neuro-modulators | Pregabalin | 37.5 mg/12 h Adjust according to response and tolerance | 75-300 mg /to single dose | OR | Pyrexia, drowsiness |
| | Gabapentin | 5 mg/kg/24 h Adjust according to response and tolerance | 5 mg/kg/24 h Adjust according to response and tolerance | OR | Viral infections, generalized edema |

DISCUSSION

Nonsteroidal anti-inflammatory analgesics are the most widely used drugs par excellence in the control of postoperative pain in dental treatments; however, in dentistry the use of analgesics for prolonged periods of time is rare, as they are prescribed for symptomatic relief for 3 to 5 days.

Diaz and Huerta in their experimental study of 915 people, described that there is a lack of success in pain control in more than 20% of the population studied, which is largely affected by absenteeism from work and changes in social habits.²² On the other hand, Medrano et al pointed out that 40% of the population within their study refers to going to the dentist for dental pain.²³

Flores and Aguilar carried out an experimental study in which they evaluated the use of drugs for the control of dental diseases in the dental office, where in their study population only 4% of dentists used an adequate pharmacological prevention scheme.²⁴ On the other hand, Karaben et al in their study on the analysis of prescriptions prescribed by dentists, obtained the result that 20% of these prescriptions are not correctly filled, Karaben et al as a result of their study on the analysis of prescriptions prescribed by dentists, obtained the result that 20% of these prescriptions are not correctly filled, which Christiani et al also noted, concluding in their study that there is little information among dentists about patient safety in pharmacological ingestion.^{25,26}

Studies show that the best strategy for acute pain management is the one that provides the greatest comfort with the least adverse effects, taking into account the pain assessment, risk profile, and comorbidity. Flores et al mentioned in their experimental study that only 7% of the dentists surveyed prescribed NSAIDs. They also mentioned that when it comes to fighting an inflammatory process, the respondents mentioned the use of naproxen as the first option, followed by ibuprofen, diclofenac and nimesulide.²⁷ This reinforces what Bosch et al mentioned that one of the greatest challenges in current dental practice is the prescription of effective and safe drugs for the prevention and treatment of oral pain; therefore, the advancement of pharmacological knowledge requires daily updating on the part of the dentist.²⁸

Similarly, Mehlisch mentions the importance of taking into account the pharmacological interactions that may occur when two drugs are administered simultaneously in order to achieve greater analgesic effects. However, the random combination of analgesics alone is not sufficient to achieve synergism.²⁹ This should be achieved by taking into account some considerations, such as the fact that both drugs have different mechanisms of action (Advil, Dorixin-Flam, Dualgos, etc).

On the other hand, Duran et al in their guide on pharmacological prescription in dentistry, suggest the use of the European academy of pediatric dentistry guide when prescribing drugs, since this guide is not an exclusive tool, but rather a facilitator for making quick decisions on pharmacological therapy.³⁰ For their part, Herrero et al state that the appropriate use of guidelines in pharmacological therapy can lead to better therapeutic success, in any case, the dentist should evaluate the clinical conditions of the patient in order to carry out a pharmacological therapy that is individualized to his or her needs.¹⁴

CONCLUSION

Orofacial pain should be systematically analyzed, from the interview to the intra- and extrabuccal exploration, in order to objectively localize the origin and nature of the pain, facilitating the prescription of analgesics or NSAIDs as adjuvants in dental treatments.

The dentist must have the necessary skills to control pain through the use of drugs, knowing the actions and effects of the drugs he/she prescribes, so as to make a rational, safe and therapeutic prescription, taking into account the risk/benefit ratio for each patient.

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