Review Article

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The Pain Management in Orthodontics

Dentistry Section

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ABSTRACT

Pain and discomfort are the frequent side-effects of the orthodontic therapy with fixed appliances. The people who experience orthodontic pain are likely to self-medicate with nonprescription pain relievers before seeing the dentist. It is imperative for an orthodontist to address questions that might arise in a clinical setting from the viewpoint of the clinicians and the patients/parents. This article will provide an overview of the current management strategies which are employed for alleviating orthodontic pain.

Key Words: Orthodontic pain, Analgesics, NSAIDS, Dental pain, Anesthetic gels, Aspergum

INTRODUCTION

Pain, which is a subjective feeling that shows large individual variations, is one of the major reasons for the withdrawal from the treatment among orthodontic patients [1]. The percentage of the adolescents who reported pain during the Fixed Orthodontic Treatment (OT) has been reported to be 91 per cent, and in 39 per cent of these individuals, pain was experienced during each step of the treatment [2]. It is dependent upon factors such as age, gender, the individual pain threshold, the magnitude of the force which is applied, the present emotional state and stress, cultural differences, and previous pain experiences. The forces which are applied on teeth trigger an inflammatory response which involve pain and bone resorption, which constitute the basis of the tooth movement [3- 5]. A study which was done in India revealed that 8 per cent of a study population discontinued the orthodontic treatment because of pain [6].

The methods which are used for controlling pain during the orthodontic treatment range from anaesthetics, analgesics, the application of low-level laser therapy to the periodontal tissues [7], Transcutaneous Electrical Nerve Stimulation (TENS) [8,9], and vibratory stimulation of the periodontal ligament [10]. All these methods have been partially successful in achieving pain relief. However, the use of Non-SteroidalAnti-Inflammatory Drugs (NSAIDs) is the preferred method of pain control which is related to fixed orthodontic appliances.

Analgesics

Analgesics have been largely prescribed for the alleviation of the symptoms which are felt by the patients who undergo OT. The drugs which are available for pain management belong to two major groups: the non-narcotic analgesics (e.g. NSAIDs) and the opioids (or narcotics). The most commonly NSAIDS in dentistry are aspirin, ibuprofen and paracetamol, all of which are available as 'over the counter' medications.

Mechanism of Action

Prostaglandins (PGs) are typical inflammatory and pain mediators which result from the degradation of arachidonic acid. Their synthesis is mediated by two different COX isoenzymes. The constitutive COX-1 does not exhibit a dynamic regulation, while the COX-2 expression is subject to regulation by several environmental conditions [11]. COX-1 is implicated in general homeostasis, and it is found in most of the organs and the tissues (it is a constitutive isoenzyme). In contrast, COX-2 is not detected in the tissues, and it only appears in response to certain stimuli (it is an inducible isoenzyme). Based on the hypothesis that a selective COX-2 inhibition would induce the desired anti-inflammatory effects without the undesirable side effects (particularly at the gastric level) which are associated with the COX-1 inhibition, drugs which are known as "coxibs" or selective COX-2 inhibitors have been developed. Coxibs show anti-inflammatory properties, thus preserving the COX-1pathway and therefore allowing the natural production of some PGs which are important because of their gastrointestinal protective roles [12].

Studies have stated that if NSAIDs are given before the procedure, the body absorbs them before the tissues are damaged and before the subsequent prostaglandin production [13].

Clinical Trials on Analgesics

In the clinical development of analgesics, the first step is to demonstrate that they alleviate pain, and it is necessary to use placebo [14,15]. Many NSAIDs like ibuprofen [16], aspirin [17] and acetaminophen [18] have been shown to produce significant reductions in the dental pain, by taking up randomized, double-blind placebo-controlled clinical trials. Ngan et al., [1] found that ibuprofen and aspirin provided more relief of the orthodontic pain than placebo when they were given immediately after the separator or the archwire placement and they concluded that ibuprofen was the choice analgesic for the control of orthodontic pain. Law et al., [19] found that the subjects who took preemptive ibuprofen reported less pain at 2 hours than the subjects who had placebo or ibuprofen after the separator placement. However, no significant differences were found between the post-treatment group and the placebo group at any time during the seven days.

Bernhardt et al., [20] found that the subjects who received ibuprofen before the separator placement or pre- and post-treatment

ibuprofen were in less pain at 2 hours and at bedtime than the subjects who received only post-treatment ibuprofen. Polat and Karaman [21] compared the orthodontic pain control which was achieved with a preemptive and one post-treatment (6 hours after bonding) dose of 600 mg ibuprofen, 100 mg flurbiprofen, 500 mg acetaminophen, 550 mg naproxen sodium, 300 mg aspirin, or placebo. The results showed that all the analgesics decreased the pain as compared to the placebo group. However, the lowest pain levels were experienced by those who took naproxen sodium, aspirin, and acetaminophen.

Paracetamol (acetaminophen) was first identified in the late nineteenth century and it was available in the UK on prescription in 1956, and over-the-counter in 1963 [22]. Since then, it has become one of the most popular antipyretic and analgesic drugs worldwide, and it is often also used in combination with other drugs. The lack of a significant anti-inflammatory activity of paracetamol implies a mode of action which is distinct from that of the non-steroidal anti-inflammatory drugs. Yet, the Cochrane Systematic Review, 2004 concluded that paracetamol was effective against the postoperative pain in adults [23].

Piroxicam is an oxicam derivative (enolic acid) that inhibits COX-1 and COX-2 and it has antiinflammatory, analgesic, and antipyretic activities. It is a nonselective COX inhibitor. Approximately 20% of the patients experience side effects with piroxicam, and about 5% of the patients discontinue its use because of these effects [24].

Tenoxicam, a long acting analgesic has been in use for a long time, with good patient compliance, as it only needs to be used once a day because of its long elimination half-life [25]. It has shown good results in controlling acute pain of mild or moderate intensity, such as the pain which is triggered by an orthodontic activation, without the presentation of any significant adverse effects [26-28].

Anaesthetic Gels

Anaesthetic gels are safer alternatives to analgesics in reducing the pain which results from orthodontic procedures. Keim et al., [29] in their study, stated that they may be of use when orthodontic procedures are performed, such as band placement and cementation, archwire ligation, and band/bracket removal. The advantage of this system is its delivery method, which simply introduces the gel into the gingival crevice and makes it entirely painless.

Chewing Gums

Proffit et al., [30] suggested chewing gums or plastic wafers during the first few hours of the appliance activation, in order to reduce the pain. Aspergum [31], a weak analgesic chewing gum with aspirin, was found to be of great help in the pain relief, after an orthodontic mechanotherapy.

CONCLUSION

In terms of the orthodontic treatment, there is an increased apprehension from the patients as well as their parents regarding the pain during the treatment and there are hardly any RCTs on the analgesic usage among orthodontists. There is a need to streamline the research in this area. The patients should be treated with NSAIDs as the 'first choice' drugs, at doses that have been proved to be effective in the literature and with the perspective of balancing the patients' analgesic requirements with the potential for adverse effects.

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