

Non-Analgesic Choice for Pain Management in Orthodontic

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Abstract: The bonding of orthodontic appliances to teeth commonly results in pain and discomfort. To alleviate the pain, analgesics, such as non-steroidal anti-inflammatory drugs (NSAIDs), are frequently prescribed. However, orthodontists and the parents of patients are equally concerned that pain relief medications may be misused or toxic, so seek safer, effective pain-alleviating interventions; these include non-pharmacological treatments. To evaluate the efficacy of various alternative interventions in reducing pain associated with orthodontic treatments, a well-designed randomised clinical need to be undertaken.

Keywords: Orthodontic, pain, non-pharmacological, chewing gum.

1. INTRODUCTION

Pain is a common side effect of orthodontic and many patients are fearful of experiencing pain as a consequence of receiving orthodontic treatment. Indeed, prior to treatment, fear of pain and discomfort are the patients' major concerns [1,2]. This is not unjustified as 91% of orthodontic patients experience pain and it is cited as being the worst part of the treatment [8]. The knock-on effect of this is that patients are less likely to take up treatment or be compliant once orthodontic apparatus have been fitted [3]. It is estimated that due to pain, 8% of patients do not continue with the treatment [4]. Inflammation, ischaemia and compression of periodontal ligaments due to oedema are the most frequent causes of pain [1]. Generally, about 2 hours after orthodontic force has been applied, the pain begins to manifest and continues to increase until it peaks around 24 hours after treatment. The pain then slowly decreases over the next 5–7 days. There is a clear role for clinicians to reduce or eliminate the pain experienced by patients after receiving orthodontic treatment.

NSAIDs are typically prescribed to manage orthodontic pain. Yet using these drugs is not without complication of side effects, giving rise to concerns about their use in patients who are still growing [9,10]. Other non-pharmacological interventions that can be used to help alleviate pain include chewing gum, bite wafers, , low-level laser therapy (LLLT), vibration stimulation and psychological intervention.

2. CHEWING GUM AND BITE WAFER

Giving the jaw muscles some resistance work in the form of chewing gum or a bite wafer is considered an effective pain-relieving alternative to pharmaceutical remedies [15]. The chewing action restores blood flow, minimising inflammation and oedema, thereby reducing the compression of periodontal ligaments on nerves and blood vessels [1]. Proffit et al. recommends that for the 8 hours following an orthodontic procedure, patients repetitively chew a plastic wafer or sugarless gum [11].

Clinical trials on chewing gum and bite wafer:

Ireland et al. performed a multicentre randomised controlled trial (RCT) that explored the effect upon pain of sugar-free chewing gum and the use of analgesics [12]. The researchers found that chewing gum was as effective as analgesics. They

also noted that 82% of those who chewed gum still took analgesic relief, compared to 91% of the control group who took analgesics. The researchers concluded that chewing gum could minimise the need for pharmaceutical pain relief.

In other research conducted by Farzanegan et al., it was found that compared to the placebo group, patients who chewed gum after installing an initial archwire experienced less pain 24 hours and 7 days after fixed appliances. Also, those in the placebo group reported having more pain at day 7 than those who used a hard wafer. The researchers assert that bite wafers and chewing gum are suitable pain relieving alternatives to NSAIDs for orthodontic patients. Similar results were obtained by Benson et al., who performed an RCT to evaluate the pain-relieving effects of chewing gum on patients experiencing pain due to their fixed orthodontic appliances. Patients were allocated into gum chewing and non-gum chewing groups; they completed questionnaires 24 hours and 1 week after the appliances had been installed. The researchers noted that there was a significant reduction in pain recorded by those who chewed gum. The participants by Murdock et al. were given either a bite wafer or over-the-counter (OTC) analgesics. The findings showed that bite wafers were effective in relieving pain following orthodontic treatments. The researchers argue that the advantages of mechanical pain relievers is that they are free from the side effects associated with NSAIDs and can be used anywhere and do not require supervision.

A contradictory result was reached by Otasevic et al. [16]. They reported that patients who had bite wafers experienced more pain than those who had refrained from chewing hard food. However, the study's authors recognise that there was a flaw in the study's design as participants were instructed to chew the wafers to avoid pain, priming participants to expect pain as being inevitable. The control group were instructed not to chew hard food, as it would cause pain, which again could set the participants expectation that they would not experience pain if they avoided hard food.

Low level laser therapy:

This type of intervention aims to stimulate biological processes that initiate anti-inflammatory mechanisms to relieve pain in periodontal tissue [17]. A study conducted by researchers group explored the onset of pain in patients who had a fixed appliance fitted. The group that received laser treatment reported less pain than those who did not. Comparable results were collected from another study that compared laser treatment against placebo for pain relief following banding. The laser-irradiated group reported lower perceptions of pain at 6 hours ($P < 0.05$) and 30 hours ($P < 0.05$) compared to the control group. However, at 54 hours, there was no detectable difference between the groups [19]. Other recent studies support earlier findings with patients who receive LLLT reporting reduced pain experiences compared to those who have not had LLLT [20,21].

Vibratory stimulation:

Stimulation by vibration devices is another non-pharmacological means of reducing the orthodontic pain. A proprietary device initiates a force that stimulates nerve fibres and blood circulation in periodontal ligaments, which minimises ischaemia [22]. Patients are recommended to bite on the vibratory device every day for short periods. A long follow up study for four months found that reduce overall pain during the second and the fourth month with the highest pain received following archwire activation (23). Yet Woodhouse et al. did not detect any difference in the levels of pain between patients who used a vibration device one week after having two archwires fitted compared to those that didn't use such vibration device [24]. The conclusion reached by the researchers was that vibration devices do not confer any pain-relieving benefit. In a recent study, researchers found that patients who used vibratory stimulation consumed fewer analgesics in the first 24 hours following fitting the appliance; but there was no significant difference at 6 hours, 3 or 7 days [25]. In general, studies researching vibratory stimulation are short in duration, with short observation periods and scant evidence supporting their benefit.

3. PSYCHOLOGICAL INTERVENTIONS

Psychology is key in individual's perceptions of pain [26]. According to the literature, the relationship between anxiety and pain is such that they affect each other [27-29]. Huang et al. reports on the effectiveness of using cognitive behavioural therapy (CBT) to reducing orthodontic pain [30]. A total of 36 participants were recruited and randomly assigned to one of three groups: the control group, a CBT group or one where they listened to brainwave music. The results showed that 24 hours and 3 days after intervention, patients who had received CBT or listened to the brain music had less pain than control. The effect then diminished, as by day 7 there was no difference between control and either of the interventions.

4. OTHER INTERVENTION

Non-pharmaceutical interventions also include post-treatment text messaging and verbal communication follow-ups. Keith et al. evaluated the effectiveness of using text messages for 7 days after orthodontic treatment. Their results indicate that patients who had received text communications experienced less pain than those who did not have follow-up communication.

5. CONCLUSION

There is an absence of consistent evidence to support the effectiveness of non-pharmacological interventions to manage pain in orthodontics. There is a need to conduct an RCT with a lengthy follow-up. The trials showed compare the non-pharmacological pain management to pharmacological regarding benefits, risk and the costs to have full image for these comparisons.

REFERENCES

- [1] Furstman, L. and Bernick, S. Clinical considerations of the periodontium. *American Journal of Orthodontics*, 61, 138–155, 1972.
- [2] O'Connor, PJ. Patients' perceptions before, during and after orthodontic treatment. *Journal of Clinical Orthodontics*, 34, 591-592, 2000.
- [3] Serogl, HG., Klages, U. and Zentner, A. Functional and social discomfort during orthodontic treatment—effects on compliance and prediction of patients' adaptation by personality variables. *European Journal of Orthodontics*, 22, 307–315, 2000.
- [4] Patel, V. Non-completion of active orthodontic treatment. *British Journal of Orthodontics*, 19, 47-54, 1992.
- [5] Erdinc, AM. and Dincer, B. Perception of pain during orthodontic treatment with fixed appliances. *European Journal of Orthodontics*, 26, 79-85, 2004.
- [6] Fernandes, LM., Ogaard, B. and Skoglund, L. Pain and discomfort experienced after placement of a conventional or a super elastic NiTi aligning arch wire. A randomized clinical trial. *Journal of Orthodontics and Dentofacial Orthopedics*, 59, 331-339, 1998.
- [7] Jones, ML. and Chan, C. The pain and discomfort experienced during orthodontic treatment: a randomized controlled clinical trial of two initial aligning arch wires. *American Journal of Orthodontics and Dentofacial Orthopedics*, 102, 373-381, 1992.
- [8] Pringle, AM., Petrie, A., Cunningham, SJ. and McKnight, M. Prospective randomized clinical trial to compare pain levels associated with 2 orthodontic fixed bracket systems. *American Journal of Orthodontics and Dentofacial Orthopedics*, 136 (2), 160-167, 2009.
- [9] Mayor S. Warning against overuse of drugs for inattentive children. *BMJ*. 28; 313(7060):770, Sept. 1996.
- [10] Olfson M, Marcus SC, Weissman MM, Jenson PS. National trends in the use of psychotropic medications by children. *J Am Acad Child Adolesc Psychiatry*. 41(5):514-21, May 2002.
- [11] Proffit, W.R., Fields, H.W. and Sarver, D.M. *Contemporary Orthodontics*. Mosby Elsevier, St Louis, Missouri, 5th edition, 2013.
- [12] Ireland, AJ., Ellis, P., Jordan, A., Bradley, R., Ewings, P., Atack, N.E., Griffiths, H., House, K., Moore, M., Deacon, S., Wenger, N., Worth, V., Scaysbrook, E. and Sandy, JR. Comparative assessment of chewing gum and ibuprofen in the management of orthodontic pain with fixed appliances: A pragmatic multicenter randomized controlled trial. *American Journal of Orthodontics and Dentofacial Orthopedics*, 150, 220-227, 2016.
- [13] Farzanegan, F., Zebarjad, S., Alizadeh, S. and Ahrari, F. Pain reduction after initial archwire placement in orthodontic patients: A randomized clinical trial. *American Journal of Orthodontics and Dentofacial Orthopedics*, 141, 169-173, 2012.

- [14] Benson, R. and Al-Bloushi, R. The effect of chewing gum on the impact, pain and breakages associated with fixed orthodontic appliances: a randomized clinical trial. *Orthodontic Craniofacial Research*, 15, 178-187, 2012.
- [15] Murdock, S., Phillips, C., Khondker, Z. and Hershey, H. Treatment of pain after initial arch wire placement: A noninferiority randomized clinical trial comparing over-the-counter analgesics and bite-wafer use. *American Journal of Orthodontics and Dentofacial Orthopedics*, 137, 316-323, 2010.
- [16] Hashmi JT, Huang YY, Osmani BZ, Sharma SK, Naeser MA, Hamblin MR. Role of low-level laser therapy in neurorehabilitation. *PM & R : the Journal of Injury Function and Rehabilitation*. 2(12 Suppl 2):S292–305, 2010.
- [17] Harazaki M, Isshiki Y. Soft laser irradiation effects on pain reduction in orthodontic treatment. *Bulletin of Tokyo Dental College*.38(4):291–5, 1997.
- [18] Turhani D, Scheriau M, Kapral D, Benesch T, Jonke E, Bantleon HP. Pain relief by single low-level laser irradiation in orthodontic patients undergoing fixed appliance therapy. *American Journal of Orthodontics and Dentofacial Orthopedics*.130(3):371–7, 2006.
- [19] Kim WT, Bayome M, Park JB, Park JH, Baek SH, Kook YA. Effect of frequent laser irradiation on orthodontic pain. A single-blind randomized clinical trial. *Angle Orthodontist* 83(4):611–6, 2013.
- [20] Nóbrega C, da Silva EM, de Macedo CR. Low-level laser therapy for treatment of pain associated with orthodontic elastomeric separator placement: a placebo-controlled randomized double-blind clinical trial. *Photomedicine and Laser Surgery*. 31:10–16, 2013.
- [21] Lobre WD, Callegari BJ, Gardner G, Marsh CM, Bush AC, Dunn WJ. Pain control in orthodontics using a micropulse vibration device: A randomized clinical trial. *Angle Orthodontist*. 86(4):625–30. ; DOI: 10.2319/072115-492.1. 2016.
- [22] Woodhouse NR, DiBiase AT, Papageorgiou SN, Johnson N, Slipper C, Grant J, et al. Supplemental vibrational force does not reduce pain experience during initial alignment with fixed orthodontic appliances: a multicenter randomized clinical trial. *Scientific Reports*. 5:17224. ; DOI: 10.1038/srep17224, 2015.
- [23] Miles P, Fischer E. Assessment of the changes in arch perimeter and irregularity in the mandibular arch during initial alignment with the AcceleDent Aura appliance vs no appliance in adolescents: a single-blind randomized clinical trial. *American Journal of Orthodontics and Dentofacial Orthopedics*. 150(6):928–36, 2016.
- [24] Melzack R, Wall PD. Pain mechanisms: a new theory. *Science*. 150(3699):971–9, 1965.
- [25] Serogl, HG., Klages, U. and Zentner, A. A Pain and discomfort during orthodontic treatment: Caustative factors and effects on compliance. *American Journal of Orthodontics and Dentofacial Orthopedics*, 114, 684-691, 1998.
- [26] Schupp CJ, Berbaum K, Berbaum M, Lang EV. Pain and anxiety during interventional radiologic procedures: effect of patients' state anxiety at baseline and modulation by nonpharmacologic analgesia adjuncts. *Journal of Vascular and Interventional Radiology*. 16(12):1585–92, 2005.
- [27] Theunissen M, Peters ML, Bruce J, Gramke HF, Marcus MA. Preoperative anxiety and catastrophizing: A systematic review and meta-analysis of the association with chronic postsurgical pain. *Clinical Journal of Pain*. 28(9): 819–41, 2012.
- [28] Huang R, Wang J, Wu D, Long H, Yang X, Liu H, et al. The effects of customised brainwave music on orofacial pain induced by orthodontic tooth movement. *Oral Diseases*. 22(8):766–74, 2016.
- [29] Keith DJ, Rinchuse DJ, Kennedy M, Zullo T. Effect of text message follow-up on patient's self-reported level of pain and anxiety. *Angle Orthodontist*. 83(4):605–10, 2013.