



CAUSES AND MANAGEMENT OF ORTHODONTIC PAIN- A REVIEW

Orthodontics

Dr. Shalini Nagarajan*	Post graduate student, Department of Orthodontics and Dentofacial Orthopaedics, Thaimoogambigai Dental college and hospital, Chennai. *Corresponding Author
Dr. Aishwarya Ashokkumar	Post graduate student, Department of Orthodontics and Dentofacial Orthopaedics, Thaimoogambigai Dental college and hospital, Chennai.
Dr. Vinoth Kumar R	Reader, Department of Orthodontics and Dentofacial Orthopaedics, Thaimoogambigai Dental college and hospital, Chennai.
Dr. Vivekanandhan U	Reader, Department of Orthodontics and Dentofacial Orthopaedics, Thaimoogambigai Dental college and hospital, Chennai.

ABSTRACT

Orthodontic pain, the most common problem arising as a result of orthodontic force application, is a major cover of distress for practitioners and patients. Patients who underwent orthodontic treatment experienced pain and discomfort which could be the most common reason for discontinuation of orthodontic treatment. Pain is considered as a subjective response to noxious stimuli. It can differ from person to person and is controlled by certain factors such as age, gender, previous pain experiences, stress or anxiety, and type of appliance. The objective of this literature review was to discuss the various possible causes of orthodontic pain and to discuss the various management options for the orthodontic pain.

KEYWORDS

orthodontic pain, discomfort, management.

INTRODUCTION

Pain and discomfort are a common thing that encountered during active orthodontic treatment with fixed appliances. Pain usually starts within four hours, increases over the next 24 hours, and decreases within week after initial bonding and placement of separators. The major cause of pain and discomfort in orthodontic treatment is due to multiple factors such as pressure, ischemia, inflammation, and edema related to tooth movement. Surveys performed to determine the experience of orthodontic pain have rated it as a major disadvantage to orthodontic therapy and a most common reason for discontinuing treatment. Patient's compliance during the orthodontic treatment is directly associated with the discomfort experienced by the patient during orthodontic therapy^{2,3}. Among various age groups, children report very less pain as compared to adults. In the same age group, females report greater pain experiences as compared to the males⁵. An study Indian study revealed that eight percent of a study population discontinued the orthodontic treatment because of pain¹⁶. The various methods used for controlling pain during the orthodontic treatment include pain relieving medications, use of low-level laser therapy, Transcutaneous Electrical Nerve Stimulation (TENS), and vibratory stimulation of the periodontal ligament and many more that discuss later. All these methods have been successful to a certain degree, however, Non-Steroidal Anti-Inflammatory Drugs (NSAIDs) has emerged as the most preferred method¹⁷. The purpose of this literature review was to discuss the various possible causes of orthodontic pain and to discuss the various management options for the orthodontic pain.

CUASES OF ORTHODONTIC PAIN:

Orthodontic pain is the result of compression of the periodontal ligament by the tooth resulting in an inflammatory response mediated by cytokines and prostaglandin¹.

PLACEMENT OF SEPERATORS:

Patients start to experiencing the pain right from the beginning of orthodontic treatment that is, placement of separators. Asiryet *al.* conducted a study to evaluate the effect of elastomeric separators on pain experienced by patients and concluded that pain associated with orthodontic separation starts and peaks within four to forty eight hours from the placement of separators and starts to decline to reach the lowest level after five days⁹.

AFTER BONDING:

Most of the orthodontic patients report pain, due to changes in the periodontal ligament and surrounding soft tissues, with intensity and frequency varying according to age. All the patients complains of pain

after bonding procedure and initial wire placement. Cioffiet *al.* concluded the result as reduced pain response in their patients during initial wire placement when they used heat activated thermal nickel-titanium (Niti) as compared to superelastic Niti¹⁰.

ELASTICS:

Intermaxillary elastics have been found to cause pain in patients, but the pain due to elastics was not lasting as long as the pain found after initial bonding¹¹.

DURING ACTIVATION OF APPLIANCE:

Appliance activation causes changes in the periodontal ligament producing areas of pressure and tension leading to pain and discomfort to the patient. There was an increase in pain twenty four hours after appliance activation was found by Treinet *al.* in their patients¹². Luppnapornlarpet *al.* observed that the amount of force levels on the pain intensity and tooth movement and thus concluded that lower forces has produced less pain as compared to higher forces with equally effective tooth movement¹³.

WHILE DEBONDING:

Maxillary and mandibular anterior teeth are more sensitive to pain than posterior teeth during debonding. Williams and Bishara evaluated the threshold level for patient discomfort at debonding and concluded that tooth mobility and force application were the two important influencing factors²³.

DISSCUSION-CAUSES OF ORTHODONTIC PAIN:

Many patients avoid orthodontic treatment because of the fear of pain. It is reported in the study of Kvam that 95% of the patients experience pain after orthodontic treatment out of which only few only experience severe pain¹⁵. Orthodontist should always try to reduce the anxiety level of the patients by proper counseling and explanation of the procedure we are going to do. The level of pain is comparatively different among male and female patients. The experience of pain seems to be slightly higher in females compared to male which is not significant statistically. The study of Bernhardt *et al.* has concluded that pain experienced after orthodontic treatment is greater than pain experienced after extraction¹⁶.

METHODS OF MANAGEMENT:

According to various studies, both pharmacological and non-pharmacological methods were useful in orthodontic pain management. Hence, orthodontists must use their best knowledge to assess each case individually and select a proper treatment modality based on pain threshold level of an individual.

PHARMACOLOGICAL MANAGEMENT:

Several articles discussed the importance of pharmacological management of pain during orthodontic treatment. Non steroidal anti inflammatory drugs have been found to reduce the rate of orthodontic tooth movement when consumed for an increased period. More number of research and studies have showed the comparing the efficacy and side effects of various NSAIDs.

Non Steroidal Anti Inflammatory Drugs (NSAIDs) are often prescribed by orthodontists to their patients to receive the pain caused during orthodontic tooth movement. Though, analgesics are advised after the procedure is performed, but intake of these analgesics has been found to be useful before procedures like separator placement¹⁷. A report based on a review states that NSAIDs stops tooth movement and also increase the risk of root resorption. Therefore, paracetamol was considered the most safest NSAID that had no influence on the tooth movements as well as root resorption²⁴. Young *et al.* concluded that another drug valecoxib which administered before the procedure to relieve pain caused by initial wire placement²⁰.

NON PHARMACOLOGICAL MANAGEMENT:

Other treatment modalities in orthodontic treatment include chewing gum, biting on wafers, low level laser therapy and so on.

BITE WAFERS:

Mangnallet *al.* conducted a studying concluded that there was reduction in pain during debonding procedures when the patients were made to bite on soft acrylic wafers¹⁴. Hwang *et al.* also suggested the use of the bite wafers to relieve pain after orthodontic procedures¹⁹.

LOW LEVEL LASER THERAPY:

Low level laser therapy (LLLT) had been used as a treatment modality for orthodontic pain control. Besides its analgesic effect, it also enhances tissue recovery and speeds up the tooth movement. Several studies have discussed the proposed benefits of this treatment modality. Fujiyama *et al.* studied the effect of carbon dioxide laser on pain reduction in 60 patients and concluded that local carbon dioxide laser irradiation reduced pain without affecting the orthodontic tooth movement¹⁸. Studies showed that single dose, helium neon laser therapy was found to be most effective in reducing orthodontic pain in patients. The therapy contributed to a 12.1% pain reduction compared to the placebo group. But the study had its own limitations, and no previous studies had investigated the effectiveness of helium-neon laser therapy versus other laser types²⁵.

CHEWING GUM:

Chewing gum during first few hours of appliance activation in order to reduce pain has been suggested. Chewing gum helps to temporarily displace the teeth sufficiently to allow blood to flow through compressed areas. Benson *et al.* has done a randomized clinical trial on 57 patients and concluded that the use of chewing gum significantly decreased both the impact and pain from the fixed appliances²⁰.

TRANSCUTANEOUS ELECTRIC NERVE STIMULATION [TENS]:

Roth and Thrash studied effect of TENS in reducing pain after separator placement. It was able to reduce pain within a short span of time of electrode placement^{7,22}.

BEHAVIORAL MANAGEMENT:

Studies have showed that psychological perspective and behavioral management might help in preventing pain in orthodontic patients. Wang *et al.* focused on the idea of establishing good orthodontist and patient communication. Pain can be prevented if orthodontists explains their patients about the procedure and expected pain during treatment. And also, cognitive behavioral therapy was effective in controlling the pain during the initial stages of orthodontic therapy²¹.

DISCUSSION-MANAGEMENT OF ORTHODONTIC PAIN:

The major thing regarding NSAIDs is the interference produced on inflammation associated with tooth movement process. Very low doses taken for one or two days in the initial stages will not affect the tooth movement process as such. The current trend is directed towards use of pre-emptive or pre-operative analgesics, which are administered at least one hour before every orthodontic procedure. It is crucial that pain control during orthodontic treatment should be considered as a most important aspect of orthodontic mechanotherapy and NSAIDs remain the common and first method for pain control during

orthodontics. Lack of an appropriate protocol for their administration after orthodontic appointments is considered to be a major disadvantage requiring attention in future research.

The final findings indicate that analgesics are still the main and first line treatment modality to reduce orthodontic pain. However, the drug actions as well as their side effects should be identified before prescribing these medications in daily clinical practice. Roth and Thrash (1986) found the effect of TENS in periodontal pain reduction after separator placement. Although it was effective in reducing pain within 6 seconds of electrode placement, no additional reports have been published. Lim *et al.* (1995) in a clinical study on the efficacy of low-level laser therapy in orthodontic pain reduction found discouraging results and it was not found to produce immediate pain relief in orthodontic patients.

CONCLUSION:

Orthodontists must use their knowledge to assess the pain threshold level of each patient individually. Effective orthodontist and patient communication and targeted nutritional guidance might help in preventing pain and discomfort. Based on the available studies, analgesics remained the effective and common method of pain management. Moreover, while suggesting analgesics, orthodontists must be aware of the pharmacological action of each drug. A maximum recommended dose should be taken into consideration for each patient before prescribing the medicine. Nevertheless, pain management is a complex phenomenon. Hence, further investigations and combining different methods of orthodontic pain control with appropriate study designs and large sample sizes are required.

REFERENCES:

- Shenoy N, Shetty S, Ahmed J, Shenoy AK. The pain management in Orthodontics. *Journal of Clinical and Diagnostic Research* 2013;7:1258-1260.
- Sergl HG, Klages U, Zentner A. Pain and discomfort during orthodontic treatment: Causative factors and effects on compliance. *Am J Orthod Dentofacial Orthop* 1998;114:684-91.
- Doll GM, Zentner A, Klages U, Sergl HG. Relationship between patient discomfort, appliance acceptance and compliance in orthodontic therapy. *J OrofacOrthop* 2000;61:398-413.
- Firestone AR, Scheurer PA, Bürgin WB. Patients' anticipation of pain and pain-related side effects, and their perception of pain as a result of orthodontic treatment with fixed appliances. *Eur J Orthod* 1999;21:387-96.
- Sandhu SS, Sandhu J. A randomized clinical trial investigating pain associated with superelastic nickel-titanium and multi-stranded stainless steel archwires during the initial leveling and aligning phase of orthodontic treatment. *J Orthod* 2013;40:276-85.
- Breyer MD, Harris RC. Cyclooxygenase 2 and the kidney. *Current Opinion in Nephrology and Hypertension* 2001;10:89-98.
- Krishnan V. Orthodontic pain: from causes to management — a review. *European Journal of Orthodontics* 2007;29:170-179.
- Kafle D, Rajbhandari A. Anticipated Pain and Pain Experience Among Orthodontic Patients: Is there any Difference? *Kathmandu Univ Med J* 2012;38(2):71-73.
- Cioffi I, Piccolo A, Tagliaferri R, Paduano S, Galeotti A, Martina R. Pain perception following first orthodontic archwire placement — thermoelastic vs superelastic alloys: A randomized controlled trial. *Quintessence Int* 2012;43:61-9.
- Campos MJ, Raposo NR, Ferreira AP, Vitral RW. Salivary alpha-amylase activity: A possible indicator of pain-induced stress in orthodontic patients. *Pain Med* 2011;12:1162-6.
- Tuncer Z, Ozsoy FS, Polat-Ozsoy O. Self-reported pain associated with the use of intermaxillary elastics compared to pain experienced after initial archwire placement. *Angle Orthod* 2011;81:807-11.
- Trein MP, Mundstock KS, Maciel L, Rachor J, Gameiro GH. Pain, masticatory performance and swallowing threshold in orthodontic patients. *Dental Press J Orthod* 2013;18:117-23.
- Luppanapornlarp S, Kajii TS, Surarit R, Iida J. Interleukin-1beta levels, pain intensity, and tooth movement using two different magnitudes of orthodontic force. *Eur* 2010;32:596-601.