

**Non pharmacological recommendations for orthodontic pain**

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**Abstract**

For many patients undergoing orthodontic treatment pain is a common experience. The amount of initial pain and discomfort experienced may be responsible to predict the compliance with the orthodontic treatment. Analgesics may not be helpful in complete elimination of pain. Also they can cause some side effects and may also affect the rate of tooth movement. Non pharmacological techniques like vibratory stimulation, transcutaneous electric nerve stimulation, Photobiomodulation and others are used in eliminating orthodontic pain. These causes positive impact on experiences of patients, compliance and treatment outcome.

**Keywords:** Pain, Non pharmacological techniques, Photobiomodulation

**Introduction**

For many patients undergoing fixed appliance therapy pain is a common clinical symptom or a negative consequence. For 90% of patients orthodontic therapy is reported to be painful, 30% pondering their treatment because of discomfort<sup>(4)</sup> After the appliance placement pain and discomfort experienced by the patient have been shown to be severe than attributed to dental extractions.<sup>(4)</sup> It may last for 4-5 days. It's intensity ranges from slight soreness when clenching to a constant throbbing pain. Factors that influence the pain phenomena following initial arch wire includes age, gender, degree of crowding, orthodontic treatment planning , history of recent oral surgery, other psychosocial factors, sociocultural and environmental

factors. Anxiety is the main factor with perception of pain. Pain usually arises within few hours after placement of initial arch wire placement.<sup>(7)</sup> Pain reported to start at 4 hours and it's peak level occurs at 24 hours.<sup>(4)</sup>

Pain following orthodontic treatment is due to accumulation of ischaemic, oedematous and inflammatory products like cytokines (histamines, prostaglandins, encephalin, substance P, leukotrienes, etc) in the compressed periodontal ligament which causes irritation of the nerve endings in the compressed periodontium resulting in the pain. Stimulation of afferent A delta and C nerve fibers, release of neuropeptides causes hyperalgesia.<sup>(7)</sup>

Success of an orthodontic treatment depends on compliance. Appliance wear for just 50% to 60% of stimulated time was observed in case of bionator or headgear. Premature discontinuation of treatment was found in 12% of orthodontic cases.

After the initiation of orthodontic treatment pain can be controlled by various methods. Use of non steroidal anti-inflammatory drugs is a standard method of controlling pain. The drug of choice pharmacologically is ibuprofen, aspirin or other forms of mild analgesics. But they are often ineffective and produce some side effects such as allergies, gastric ulcers, bleeding disorders and reduction of tooth movement. Patients may be allergic to them or some may be unwilling to use them.<sup>(6)</sup>

A large number of non-pharmacological aids to control pain are low level laser therapy, vibratory stimulation, transcutaneous electric nerve stimulation, application of ice/cryotherapy, use of bite wafers, chewing gum, acupuncture /acupressure. Advantages of these are the avoidance of systemic and local adverse side effects associated with NSAIDs. Disadvantage of them is that

post adjustment tooth pain is not systematically assessed by any of the technique.<sup>(1)</sup>

### **Vibratory Stimulation**<sup>(3)</sup>

Some orthodontists recommend chewing on gum or plastic wafers immediately after adjustments. According to Proffit, pain can be reduced by low levels of force, but this was opposed by Lin and colleagues. Vibratory stimulation is a classic noninvasive and non-medicinal method of reducing pain.

Dr Powers first investigated orthodontic application of this method on a patient with a history of painful post adjustment episodes during closure of a wide midline diastemma with elastic chain. He observed that after placing a new elastic chain, gentle vibration of maxillary central incisors produced two effects : reversal of blanching of tissue between and above incisors and reduction of previous level of pain.



Fig. 1: Vibratory stimulation apparatus

This observation was the momentum for the commercial fabrication of a patient controlled appliance that could translate a vibratory effect to all the teeth. For this purpose a small, battery operated vibrating motor with two amplitude settings was coupled to a flexible, detachable, soft acrylic mouthpiece.

However the appliance had to be used before the pain was evident, because once the pain was manifest the vibratory effect did little to ameliorate it. This confirms the theory that the cause of orthodontic pain is a diminished blood supply to the teeth and surrounding

tissues. Vibration appears to re-establish the blood supply and intercept the ischemic response. However the analgesic response to vibration is minimal once the pain inducing ischemic response is established.

Visual analogue scales are an accepted method of measuring pain intensity. The results indicated that discomfort was significantly less at every time interval for those who used the vibratory apparatus.



Fig 2: Patient using vibratory apparatus for arch wire placement

## 2) Effects of Masticatory Bite Wafer and Avoidance of Hard Food on Pain Associated With Initial Orthodontic Tooth Movement<sup>(4)</sup>

According to Profit, the amount of pain experienced by patients could be reduced by having them engage in repetitive chewing of gum or plastic wafers during the first 8 hours after the appliance is activated as long as the light forces were used. Blood flow through the compressed areas of periodontal ligament is allowed by the temporary displacement of the teeth thereby preventing the buildup of metabolites that could in turn stimulate the pain receptors.

A study was carried out at the college of dentistry in New York to compare the effectiveness of Thera chew bite wafers with the avoidance of mastication in reducing the pain associated with initial arch wire placement.

Analgesic consumption during the recording period was compared. The consumption of analgesics like ibuprofen, aspirin by bite wafers group was not greater than reduced masticatory group.

## Transcutaneous Electric Nerve Stimulation<sup>(5)</sup>

Transcutaneous nerve stimulation is a non invasive pain control technique which is a form of stimulation produced analgesia. It is delivered via surface electrodes placed over the painful area or within the nerve innervating the painful area's distribution. From a self-contained battery source a direct current is produced usually as an asymmetric biphasic waveform with a positive rectangular wave component combined with a negative spike component. The current generated has a voltage range of 0 to 90 V (60 mA) and a frequency range of 0 to 100 Hz. Pulse width duration ranges from 10 to 200 usec. Chronic pain and post-surgical pain are the application of TENS. The first dental application of TENS was the treatment of myofascial pain dysfunction. Hansson and Ekblom (1983) compared the effects of high frequency, low frequency and placebo. TENS therapy results showed significant reduction in pain ratings in the two TENS groups as compared to the placebo group.

Less pain was reported in the TENS subjects in comparison with the placebo.

According to Stratton a high frequency / low intensity TENS application is responsible for blocking the transmission of painful stimuli by C fibers in the spinal cord. A delta and A beta fibers are stimulated by TENS application.



Fig 3: internal probe electrodes. One is placed on the crown of each tooth and the other on the palatal mucosa adjacent to the tooth

Onset of analgesia by TENS is less than 10 minutes, lasts for 30 minutes in case of high frequency/ low intensity type. Antagonist naloxane hydrochloride is not able to block it. A low frequency / high intensity TENS application on the other hand have onset of 15-30 minutes. It lasts for several hours. It can be blocked by Naloxane.

Intraoral electrodes for 6 sec per tooth are the most efficient means of TENS application.

TENS is also helpful in reducing the pain caused by treatment and toothbrushing in patients with poor oral hygiene. Pain associated with orthodontic separations is also reduced using TENS.



Figure 4: External sponge pad electronic placed bilaterally over subject's zygomatic arches

### Photobiomodulation and Pain Reduction <sup>(6)</sup>

Along with diagnosis, oral surgery, cavity preparation and enamel conditioning lasers are useful in combined surgical /orthodontic procedures like exposure of partially erupted teeth, thus blood contamination is reduced and appliance efficiency is negatively affected. To obtain Photobiomodulation lasers can be applied. Lasers have advantages in analgesia, biostimulation and have limited side effects.

Action of Photobiomodulation is by stimulation of nerve cells, stability of membrane potential and release of neurotransmitters in the inflammatory tissues, inhibitory effects on nerve depolarisation, production of energy molecules ATP and reduction of prostaglandin levels.

A study was aimed at evaluation of the effects of Photobiomodulation on pain in patients undergoing band application of maxillary molars for orthodontic treatment. Presesure sensation, bite sensitivity and pain to banded teeth due to interproximal space expansion and associated orthodontic force application may occur in case of tight dental contacts in metal band insertion. No significant difference between trial and control groups in pain measurements and questionnaire results, is the null hypothesis.



Fig. 5: Irradiation points of buccal sites



Fig 6: Irradiation points of palatal sites

### **Therapeutic Laser**

Laser is acronym composed of words: Light amplification by stimulated emission of radiation.

According to active media lasers are classified into solid, liquids or gases. According to their wave longitude they are classified into ultraviolet, visible or infrared. According to their application they are divided into soft and power laser. Soft or therapeutic laser is used for analgesic, anti-inflammatory and tissue regeneration purposes. This group includes He-Ne, Ga-As and Ga As Al. Power laser is used for surgical purposes mainly. They are CO<sub>2</sub> laser, the ND YAG laser, Holmium YAG laser, argon laser.

### **Single Low Level Laser Irradiation** <sup>(8)</sup>

LLLT have anti-inflammatory and regenerating effects. On tooth enamel it has a conditioning effect. Pain relief by LLLT is due to an inflammatory and neuronal effects of LLLT, stimulation of nerve cell and lymphocytic respiration, stabilisation of membrane potentials and release of neurotransmitters in the inflammatory tissue. Continuous waves lasers were superior to pulsed lasers for wound healing.

### **Cryotherapy** <sup>(1)</sup>

Cryotherapy is the use of low temperatures for the medical treatment and pain relief by modulation of pain transmission from tissues. Capillary contraction is increased in this therapy and there is reduction in the

temperatures of the affected areas. Thus edema is reduced by reducing permeability, haemorrhage and metabolism.

### **Acupuncture And Accupressure** <sup>(1)</sup>

Acupuncture involves the manipulation of thin, long needles inserted into the 'acupuncture points' in the skin. This is a form of Chinese medicine. Accupressure involves the application of physical pressure and is based on the acupuncture. They are used to manage acute or chronic pain.

### **Effects of Pain and Patient Experiences On Compliance**

During orthodontic treatment, pain can have a negative effect on daily activities, diet, oral hygiene and quality of life. This can cause an effect on treatment continuation and appliance wear. In most of the fixed and removable appliances pain and discomfort is seen. Also teasing, speech alteration, effects of sleeping and headgear also because negative effects on the orthodontic treatment. <sup>(1)</sup>

### **Orthodontic Pain: Effect on Fixed or Removable Appliance Wear**

Patients wearing a removable appliance usually show reduced compliance. Mostly patients do not wear headgear or intra oral elastics due to pain. In removable appliances factors affecting compliance are pain, speech changes, impact on daily activities and lack of initial motivation. <sup>(1)</sup>

### **Effect of Pain on Retainer Wear**

Hawley or vacuum formed retainers also show some level of pain and discomfort. Also they cause alteration of speech and impact on esthetics causing embarrassment. <sup>(1)</sup>

### **Conclusion**

Pain related to orthodontic treatment can be reduced by non-pharmacological approaches. They show limited

benefits but they have a positive experience on compliance and patient experiences.

## References

1. P.S.Fleming, D. Al-Moghrabi, P. Fudalej, N. Pandis : orthodontic pain : The use of non pharmacological adjuncts and it's effect on compliance
2. Jones M, Chan C. The pain and discomfort experienced during orthodontic treatment : a randomized controlled clinical trial of two initial aligning arch wires. *Am J Orthod Dentofacial Orthop.* 1992;102:373-381.
3. Stacy Ste Marie, Michael Powers, John Sheridan: Vibratory Stimulation as a Method of reducing pain after Orthodontic Appliance Adjustment
4. Maladen Otasevic, Farhad B Naini, Daljit S Gill, Robert T Lee : Prospective randomized clinical trial comparing the effects of a masticatory bite wafer and avoidance of hard food on pain associated with initial orthodontic tooth movement.(*Am J Orthod Dentofacial Orthop* 2006;130:6:e9-6.e15)
5. Peter M Roth, William James Thrash: Effect of transcutaneous electric nerve stimulation for controlling pain associated with orthodontic tooth movement (*Am J Orthod Dentofac Orthop* 90: 132-138,1986)
6. Maria Francesca Sfondrini et al : Photobiomodulation and pain reduction in patients requiring orthodontic band application:Randomized Clinical Trial : (*BioMed Reserch International* vol 2020)
7. Muhammad Azeem et al : Comparison of the analgesic effects of flurbiprofen with bite wafers on orthodontic pain (*Pakistan Oral and Dental Journal* vol 38, no.4, oct-dec2018)
8. Dritan Turhani et al : Pain relief by single low level laser irradiation in orthodontic patients undergoing fixed appliance therapy: (*Am J Orthod Dentofacial Orthop* 2006;130:371-7)
9. White LW : Pain and cooperation in orthodontic treatment *J Clin Orthod* 18 : 572-575, 1984.
10. Oliver RG, Knapman YM. Attitudes to orthodontic treatment. *Br J Orthod* 1985;12:179-88.
11. Lew KK. Attitudes and perception of adults toward orthodontic treatment. *Community Dent Oral Epidemiol* 1993;21:31-5.
12. Jones ML, Chan C. Pain in the early stages of orthodontic treatment. *J Clin Orthod* 1992;26:311-3.
13. Blechman AM. Pain-free and mobility-free orthodontics. *Am J Orthod Dentofacial Orthop* 1998;113:379-83.
14. Azerad J. Pain mechanisms and their current treatment. *Rev Orthop Dento-Facial* 1999;33:43-73.
15. Burstone C, Baldwin J, Laeless D. The application of continuous forces to orthodontics. *Angle Orthod* 1961;31:1-14.
16. Spielberger C, Gorsuch R, Lushene R. Manual for the state-trait anxiety inventory (self-evaluation questionnaire). Palo Alto, Calif: Consulting Psychologists Press; 1970
17. Furstman L, Bernick S. Clinical considerations of the periodontium. *Am J Orthod* 1972;61:138-55.
18. Oliver RG, Knapman YM. Attitudes to orthodontic treatment. *Br J Orthod* 1985;12:179-88.
19. Patel V. Non-completion of orthodontic treatment: a study of patient and parental factors contributing to discontinuation in the hospital service and specialist practice. [MScD dissertation] University of Wales, 1989 tteath Park.
20. Jones ML. An investigation into the initial discomfort caused by placement of an archwire. *Eur J Orthod* 1984;6:48-54.

21. Wilson S, Ngan P, Kess B. Time course of the discomfort in young patients undergoing orthodontic treatment. *Paediatr Dent* 1989;11:107-10.
22. Burstone CJ. Biomechanics of tooth movement. In: Krause BS. ed. *Vistas in orthodontics*. Philadelphia: Lea & Febiger, 1964. 6. Storey E, Smith R. Force in orthodontics and its relation to tooth movement. *Aust J Dent* 1952;56:11-8.
23. Reiztan K. Selecting forces in orthodontics. *Trans Eur Orthod Soc* 1956;32:108-
24. Hixon EH. Optimal force, differential force and anchorage. *AM J ORTHOD* 1969;55:437-57.
25. Boester KA, Johnston IE. A clinical investigation of the concepts of differential and optimal force in canine retraction. *Angle Orthod* 1974;44:113-9.