Recent advances in the management of orthodontic pain

Sandhya Maheshwari, Sanjeev Kumar Verma, Aditi Gaur

Abstract
Orthodontic pain is the most frequent complaint of the patients undergoing orthodontic therapy and directly influences their compliance during the treatment. The lengthy duration of treatment along with frequent pain due to the orthodontic appliances often leads to patient burn out and has been associated with discontinuation of orthodontic treatment. It is imperative for the clinicians to identify and manage the pain experienced by their patients. Various modalities for the management of orthodontic pain have been proposed over the years. The present article focuses on the common factors that lead to pain in an orthodontic patient and the various methods to relieve orthodontic pain.

Materials and Methods
The search was performed on the PubMed database using the keywords “orthodontic pain.” A total 888 articles was retrieved out of which 41 articles was considered relevant to the topic. The present is review is based on the information gathered from these articles.

Common causes of orthodontic pain
Initial stages of treatment
Pain experience has been a common problem faced by patients right from the beginning of orthodontic treatment that is, placement of separators. Asir et 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 4–48 h from the placement of separators and starts to decline to reach the lowest level on 5th day.

Key words: Laser, nonsteroidal antiinflammatory drugs, orthodontic pain, vibratory forces
Most of the orthodontic patients routinely report pain, due to alterations in the periodontal ligament and surrounding soft tissues, with intensity and prevalence varying according to age. According to Campos et al., both children and adults complain of pain after bonding and initial wire placement. Various alignment wire sequences were found to have variable pain response in patients irrespective of the material of the wire used.

Although, Cioffi et al. found reduced pain response in their patients during initial wire placement when they used heat activated thermal nickel-titanium (Niti) as compared to superelastic Niti. Fernandes et al. compared the discomfort caused by the initial placement of superelastic Niti wires and conventional Niti wires. They found greater pain experience among patients as a result of nitirol wires.

Johal et al. conducted a longitudinal study over a 3-month period, on pain experience and quality-of-life changes during fixed orthodontic treatment and concluded that initial stages of treatment results in subjective pain experience.

Intermaxillary elastics

Intermaxillary elastics have been found to cause pain in patients similar to wire placement, but the pain due to elastics was not found to last as long as the pain found after initial bonding.

Appliance activation

Appliance activation causes disruption in the periodontal ligament creating areas of pressure and tension leading to discomfort to the patient.

An increase in pain 24 h after activation of appliance was observed by Trein et al. in their patients.

Luppanapornlarp et al. evaluated the effect of force levels on the pain intensity and tooth movement and thus concluded that lower forces produced less pain as compared to higher forces with equally effective tooth movement.

Ogura et al. compared the pain intensity among subjects with light and heavy force application and found that heavy forces cause greater biting pain few hours after the force application.

Debonding of orthodontic appliances

Mangnall et al. conducted a multicenter trial and suggested that debonding of fixed appliances leads to pain experience in the patients. Furthermore, lower anteriors were reported to be most painful after debonding. Normando et al. compared two methods of debonding that is, a lift-off method and ligature cutting pliers and confirmed that lift-off method caused lesser pain to the patients during debonding.

Insertion of temporary anchorage devices

The study was conducted by Chen et al. to evaluate the pain experienced by the patients during placement of interdental implants and was compared to the baseline value of discomfort during premolar extractions. They concluded that the placement of interdental implants did not cause pain greater than that during traditional orthodontic treatment.

Management

Analgesics

Nonsteroidal antiinflammatory drugs (NSAIDs) are often recommended by orthodontists to their patients to alleviate the pain caused during orthodontic tooth movement. Usually, analgesics are advised after the procedure is performed, but preemptive administration of analgesics has been found to be useful before procedures like separator placement.

Ashkenazi and Levin reported in their study that 59% of the patients informed their orthodontist of pain, but only 21% were prescribed analgesics.

Bradley et al. conducted a randomized control trial comparing the efficacy and side effects of various NSAIDs.

Patel et al. evaluated the effectiveness of ibuprofen, naproxen sodium, and acetaminophen. They concluded that ibuprofen was superior to the placebo in relieving postseparator pain as measured by the visual analog scale pain summary scores, whereas acetaminophen and naproxen sodium did not significantly differ from the placebo.

Nonsteroidal antiinflammatory drugs have been found to reduce the rate of orthodontic tooth movement when consumed for an increased period. A number of studies have been conducted by researchers comparing the efficacy and side effects of various NSAIDs.

Paracetamol, explicitly indicated by most authors as the safest NSAID, seems to be the drug of choice in view of no influence on the range of tooth movement, the risk of root resorption or other adverse effects within oral cavity. According to Shetty et al., acetaminophen showed no significant effect on prostaglandin synthesis and may be a safe choice compared to ibuprofen for relieving pain associated with orthodontic tooth movement.

Arantes et al. evaluated an alternative drug tenoxicam in 36 patients and showed that it proved to be an effective drug during orthodontic treatment without affecting the tooth movement.

Young et al. showed another drug valecoxib to be administered before the procedure to relieve pain due to initial wire placement.

Low level laser therapy

Low-level laser therapy has been used to relieve pain in patients during various stages of orthodontic treatment.
Tortamano et al. conducted a study in on 60 patients and confirmed that a low-level laser therapy reduced the pain caused after the placement of initial archwires.\cite{30}

Fujiyama et al. evaluated the effect of carbon dioxide laser on pain reduction in 60 patients and showed that local carbon dioxide laser irradiation reduced pain without affecting the orthodontic tooth movement.\cite{31}

Dominguez and Velásquez reported reduction in pain symptoms on application of low-level laser therapy after activation of final archwires.\cite{32}

**Vibratory forces**
Based on their clinical study, Marie et al. have advised the use a vibratory apparatus by the patients to ameliorate the pain caused by orthodontic treatment. Vibratory forces are effective when used before the development of pain as they improve and re-establish the blood supply in the pain-causing ischemic areas.\cite{33}

**Bite wafers**
Mangnall et al. conducted a randomized clinical trial the results of which showed a reduction in pain during debonding procedures when the patients were made to bite on soft acrylic wafers.\cite{34} Hwang et al. suggested the use of thera bite wafers in relieving pain after orthodontic procedures.\cite{35}

**Anesthetic gels**
Keim described an anesthetic gel “oraqix” containing a combination of lidocaine and prilocaine in 1:1 ratio by weight. Such gels can be used when performing routine orthodontic procedures to relieve the patient’s discomfort.\cite{36} Kwong et al. described the use of two anesthetic gels oraqix and TAC alternate for easy placement of temporary anchorage devices and showed that TAC alternate was more effective in reducing the local discomfort.\cite{37}

**Chewing gums**
Farzanegan et al. conducted a randomized clinical trial on 50 patients to evaluate the efficacy of various measures to reduce pain after placement of initial archwires. They suggested that efficacy of chewing gums as a method to relieve pain caused due to such orthodontic procedures was comparable to that of analgesics.\cite{38} Benson et al. conducted a randomized clinical trial on 57 patients and reported that the use of chewing gum significantly decreased both the impact and pain from the fixed appliances.\cite{39}

Chewing gums can be recommended as a suitable alternative to analgesics for pain reduction in orthodontic patients.

**Medicated wax**
Kluemper et al. conducted a comparative study on subjects using wax to relieve the discomfort caused by fixed orthodontic appliances with those using wax containing slow releasing benzocaine. The patients using medicated wax reported of less pain as compared to the other group showing the analgesic properties of benzocaine containing wax.\cite{39}

**Behavioral therapy**
Wang et al. provided cognitive behavioral therapy to 150 patients and compared the effects with the use of analgesics. They concluded that the behavioral therapy was effective in pain control during initial stages of orthodontic treatment.\cite{40}

**Conclusion**
Orthodontic treatment is associated with a number of side effects most common being pain. Orthodontists must be aware of the various factors that might cause discomfort to the patients and should be able to manage such episodes to improve the compliance of patients with the orthodontic therapy. The present article has highlighted the various measures that can be undertaken to manage the pain experienced by the patients during therapy. By far, the most commonly used method is administration of analgesics, and it stays to be the most effective modality in controlling orthodontic pain.

**References**


Source of Support: Nil Conflict of Interest: No conflict of interest.