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ORTHODONTIC PAIN- CAUSES AND MANAGEMENT

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ABSTRACT:

Orthodontic pain, the most cited negative effect arising as a result of orthodontic force application, is a major matter of distress for clinicians and patients/parents 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. It becomes duty of an orthodontist to satisfy the questions arising in the mind of patients, parents and clinicians. Various modalities for the management of orthodontic pain have been proposed over the years. Aim of this review article is to throw a light on various causes of orthodontic pain and also about the recent advances in management of orthodontic pain

KEYWORDS: *Pain, discomfort, analgesics, laser therapy.*

I. INTRODUCTION:

Patient undergoing orthodontic treatment experience varying degrees of discomfort which may be a result of tension, functional restrictions or psychological aversion to wear the appliance in the public. Patient's compliance during the orthodontic treatment is associated with discomfort experienced by patient during treatment (1,2). Discomfort is defined as unpleasant tactile sensation, feeling of constraints in the oral cavity, stretching of soft tissues, pressure on the mucosa, displacement of tongue, soreness of teeth and pain (3,4,5). Pain is one of the factors that discourage patients the most from starting orthodontic movement and it is main causes for withdrawal of orthodontic treatment (6,7,8). Pain is an unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage (9).

Pain is a subjective feeling that show large individual fluctuations. Surveys of orthodontic patients have revealed that pain is among the most coted negative effect of orthodontic therapy and even compared with pain of invasive procedures such as extraction, also patient perceived orthodontic pain to be greater in incidence and severity (10)). Orthodontic tooth movement is a result of application of forces to the teeth. Force produced by orthodontic treatment promote tooth displacement in periodontal ligament space, leading to formation of area of

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compression and traction. These stimuli triggers a series of tissue reactions which results in bone remodelling of alveotus through processes of bone resorption and deposition, thus permitting changes in tooth positioning. These processes are accompanied by stimulation of nerve ending in periodontal ligament and are inflammatory reaction which result in pain (6).

During inflammation, various biochemical mediators are responsible for the pain. Pain is dependent upon several factors such as age, gender, individual pain threshold, magnitude of force applied, emotional status and previous pain experience (11,12,13). Period of acute inflammation are associated with painful sensations and reduced activity. It has been reported that peak of pain occurs the day after adjustment, with a decrease over next 6-7 days (14,15). A study which was conducted in India revealed that 8% of a study population discontinued the orthodontic treatment of pain (16). Patient undergoing fixed orthodontic treatment have reported greater pain and discomfort than with the patients with the removal appliance (1). Aim of this review article is to throw a light on various causes of orthodontic pain and also about the recent advances in management of orthodontic pain.

COMMON CAUSES OF ORTHODONTIC PAIN:

All orthodontic procedure such as separator placement, arch wire placement and activations, application of orthopaedic forces and debonding produce pain in patient (16).

First step in fixed orthodontic therapy is creating space mesially and distally to teeth which are to be banded. Pain experience has been a common problem faced by patients right from the beginning of orthodontic treatment that is, separators. Asiryet al., conducted a study to evaluate the effect of elastometic separators on pain experienced by patients and study conducted that pain associated with orthodontic separators starts and peaks within 4 to 48 hours from placement of separator and starts to decline to reach the lowest level on 5^{th} day(16). Jones reported that pain is experienced by majority of patients 4 hours after arch wire placement, which will peak at 24 hours and then decline (14).

According to Campos et al., both children and adults complain of pain after bonding and initial wire placement (15). Various alignment wire sequences were found to have variable pain response in patients. According to Jones and chan, pain from arch wire placement can be worse in some patients and could even be more than that experienced after tooth extraction (14). Comparing various arch wire to determine differences in pain perception showed statistically non-significant results (6). Cioffiet al., found reduced pain response in their patients during initial wire placement when they used heat activated thermal nickel-titanium (Niti) as compared to super elastic Niti(17).

Johalet el., conducted a longitudinal study over 3 month period, on pain experience and quality of life changes during fixed orthodontic treatment and concluded that initial stage of treatment results in subjective pain experience (18oveHixon et al., concluded that higher forces per unir area tend to increase the rate of biological response (19). Gianelly and Goldman reported that large forces caused periodontal compression and hence resulting in increased pain. Williams and Bishara evaluated the threshold level for patient discomfort at debonding and conducted that tooth mobility and force application were the two important influencing factors, and they also found intrusive forces to produce less pain at debonding in comparison with other types of force applied (20). Intermaxillary elastic have been found to cause pain in patients similar to wire placement, but the

pain due to elastic was not found to last as long as the pain found after initial bonding (21). Activation of appliance cause increase in pain after 24 hours which was observed by Trein et al., (22).

Activation of appliance causes disruption in periodontal ligament creating area of pressure and tension leading to dis comfort. Ogura et al., compared the pain intensity among subjects with light and heavy force application, and found pain increased with increase in force (13). Luppqnqpornlarp et al., evaluated the effect of force levels on pain intensity and tooth movement and also concluded that lower forces produced less pain as compared to higher force with equally effective tooth movement (23). Mangnall et al., conducted a study and suggested that debonding of fixed appliance leads to pain experience in the patients. Furthermore, Lower anteriors were reported to be most painful after debonding (24). Normando et al., compared two methods of debonding that is, lift-off method and ligature cutting pliers and concluded that lift-off method caused lesser pain compared with cutting pliers (25). Chen et al., concluded that insertion of temporary anchorage devices produces less pain compared with traditional orthodontic treatment(26).

II. MANANGEMENT OF ORTHODONTIC PAIN:

ANALGESICS:

Non-steroidal anti-inflammatory drugs are recommended by orthodontists to reduce the pain caused during orthodontic treatment. Usually, analgesics are advised the procedure is performed (19,20). Ashkenazi and Levuj reported that 59% of patients informed about pain, but only 21% were prescribed analgesics (27). Bradley et al., conducted a randomized control trial comparing the efficiency of paracetamol and ibuprofen in relieving pain due to separator placements. They suggested that patients taking ibuprofen reported discomfort on orthodontic separation (28). 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 (29). Young et al., showed another drug valecoxib to be administered before the procedure to relieve the pain due to initial wire placement (30).

LOW-LEVEL LASER THERAPY:

It has been used to relieve the pain in patients during the various stages of orthodontic treatment. Tortamano et al., conducted a study in 60 patients and concluded that low-level laser therapy reduces pain after placement of arch wires (31). 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 tooth movement (32).

VIBRATORYFORCE:

Marie et al., conducted a study and advised to use a vibratory apparatus in the patients to reduce 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 pain-causing ischaemic areas (33).

BITEWAFERS:

Mangnall et al., conducted a randomized control trial, the results of which showed a reduction in pain during debonding procedures when the patient were made to bite on soft acrylic wafers (24). Hwang et al., suggested the use of thera bite wafers in relieving pain after orthodontic procedures (34).

ANAESTHETICGELS:

Keim described an anaesthetic gel “oragix" containing a combination of lidocaine and prilocaine in 1:1 ratio by weight and these gels can be used when performing routine orthodontic procedures to relieve the patient's discomfort (35). Kwong et al., described the use of two anaesthetic gels orgix and TAC alternate for easy placement of temporary anchorage devices and showed that TAC alternate was more effective in reducing the local discomfort (36). Advantage offered by this system is its simple method of delivery which includes the introduction of gel into gingival crevice and making it entirely painless (16).

CHEWING GUMS:

Proffit et al., suggested chewing gum or plastic wafers during first few hours of appliance activation in order to reduce the pain (37). Aspergum, a weak analgesic chewing gum containing aspirin, proved to be of greater help in relieving pain after an orthodontic therapy (38).

SYSTEMIC ACUPUNCTURE:

Systemic acupuncture by professionals was found to be effective in reducing orthodontic pain (39).

MEDICATED WAX:

Klumper et al., conducted a comparative study on subjects using wax to relieve the dis comfort 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 other group showing the analgesic properties of benzocaine containing wax (9).

BEHAVIOURAL THERAPY:

Wang et al., provided cognitive behavioural therapy to 150 patients and compared the effects with the use of analgesics. They concluded that behavioural therapy was effective in pain control during initial stages of orthodontic treatment (40).

Transcutaneous electrical nerve stimulation:

Roue and thrash evaluated the effect of TENS in reducing periodontal pain after separator placement. Although it was able to reduce pain within a relatively short span of time of electrode placement, there is dearth of literature published on its use (41).

VIBRATINGNEEDLE (Vibraject^{TM}):

In orthodontic treatment sometimes we have to remove teeth for gaining space and that definitely need administration of local anaesthetic. Newer vibrotactile devices for pain control have been introduced such as vibrajet and accupal. This is a newer concept used in dentistry for pain control. Vibraject is a battery operated detachable device based on vibration and can be easily applied in routine local anaesthetic procedure. (42,43).

T-**SCANSYSTEM**:

T-scan increase the stability after the orthodontic treatment, reduce the chance of TMD and also reduce the chance of pain (44).

III. 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, Beside most common management I express the latest technology like Vibraject, TENS, Laser therapy, T-Scan etc and it stays to be the most effective modality in controlling orthodontic pain.

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