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Occlusion, Orthodontics and TMD: Unravelling the Mystery

Anamika Jakhar[1], PanduranganHarikrishnan[2*], Jasmine Nindra[3], Mona Prabhakar[4]
[1,2,3,4]Department of Orthodontics, Faculty of Dental Sciences, SGT University, Gurgaon, Haryana-122505, India.
*Email : p.harikrishnan@sgtuniversity.org

ABSTRACT
The interrelationship in Occlusion, Orthodontics and Temporomandibular disease is the top controversial debate in the research field. Moreover, in spite the nature of the apparatus used, contemporary orthodontics management seems to play no significant role in development of TMD. Nonetheless, and solid verification from a massive community-based study suggests a weakly contradictory link and support that the part of malocclusion in the cause of TMDs may not be exaggerated. In this regard, clinicians must consider the adaptability of individual patients to prevent iatrogenic maladaptation behaviour. In fact, general practitioner needs to be familiar of the multifactorial etiology of TMD and educate them about the tools available to treat patients before, during and after dental or the orthodontics procedure.
Keywords- TMDs, Orthodontics, Occlusion, TMJ, Malocclusion

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INTRODUCTION

For many years, scientists have noticed that occlusion to be one of the most important primary or the secondary cause of temporomandibular disease. TMD is a generic expression that includes abnormality and unpleasant sensation in the masticatory muscles, temporo-mandibular joints and their neighbouring tissue [1]. This is major population health issue and entitled the ordinary etiology of non-dental facial discomfort and another common muscular disorders after lower spinal pain[2-4]. The source and reason connection in malocclusion and TMDs is associated with the monitoring of anatomical relationship in tooth site and mandibular function, and high universality of TMD in the people having malocclusion differentiate to the localpublic [5]. Based on previous data [6]it described that temporomandibular joint discomfort and noise, and headaches, mouth opening restrictions, muscular hypersensitivity and ear diseases (collectively Costen's Syndrome) to the occlusal interferences and deep bite. Thirty years later, Thompson[7] hypothesized that malalignment of teeth could lead to caudal and upward displacement of condyle and that misaligned teeth needed to be corrected to alleviate the concept of occlusion and the dental hypothesis of temporomandibular diseases cause has been created. Many of the investigated study elements associated with alignment and malalignment of teeth as an estimated tool for the progression of TMD indication. For example, latest network-based studies recommended that higher than half of the verified websites used to treat bite changes for reducing TMD or malocclusions [8].

TMD AND MALOCCLUSION

The alliance between malalignment of teeth and TMD has been substantially reviewed in the publications, often showing unpredictable results. Malocclusion and TMD are two wide phrases that consists many contrasting changes [9]. Malocclusion can be distinguished by sagittal, cross sectional and vertical inconsistencies, either in the skeleton and dentistry for remodeling the bones of the temporomandibular joint [10].

The conception of Orthodontic stability

The anatomy of TMJ should be carefully considered when determining the optimal orthopedic stable joint position criteria. The articular disc of TMJ consists of thick fibrous connective tissue without vascular and nerve supply. This permits an individual to resist strong forces without damaging and causing tender irritation. The goal of the disc is to detach, shield and strengthen the mandibular fossa of condyle during functional movement. Within postural position, the elevator muscle tone and the inferior lateral pterygoid muscle stabilizes the condyle without being affected by the occlusal position. The temporal is

muscle placed the condyle in mandibular fossa. The external pterygoid and masseter muscle places the condyle anteriorly and superiorly.

There are two mechanisms which determine if there will be any intracapsular disorder will exist or not:

(i) Amount of orthopedic instability

(ii) Degree of loading.

The other element that decides whether the patient will have TMD or not, is the amount of loading. However, patients who have habit of bruxism with orthopedic inconsistency will entitled more risk for developing TMDs than nonbruxism patients having identical orthopedic instability.

Relationship between TMD and Occlusion

The first report on the correlation between occlusal factors and TMD symptoms was identified [11] in 1934. Since then, various modalities have been proposed, with orthodontic-orthopaedic treatment and adjustment of occlusion, to treat the deviation and to correct the symptoms of TMD. In epidemiology and some post-mortem studies, certain types of malocclusions are more closely associated with the development of TMD than others. This seems to be especially true for Class II and Class III malocclusions, crossbites, with open bite including severe overjets. Although the number of these cases was limited, open bite showed a similar distribution. None of these cases was limited.

Crossbite

In 1995, Brian L O Byrn[12] conducted a study to determine if the mandibular symmetry of an untreated unilateral posterior crossbite was different from that of a treated adult. In adults with unilateral crossbite, the mandible rotated posteriorly to the crossbite skull bed and the molars were placed posterolaterally. The skeletonized mandible showed no asymmetry in the two groups. It has been suggested that unilateral posterior cross bite in adults without functional mandibular displacement should not be corrected by orthodontic movements alone. Changes in condylar movement may induce asymmetric mandibular growth, as no acetabular condyle displacement was observed in adult crossbite patients.

In a 1997 study, Artun *et al* [13] confirmed that functional crossbite correction by maxillary dilation was associated with changes in condyle position and occlusal relationships. Tomographic evaluation showed that the condyle moved posteriorly and upwards on the non-crossbite side from pre-treatment to posttreatment. The upper joint space was largest within the non-crossbite sidebefore treatment, but similar on the post-treatment side. More symmetrical occlusion and condyle relationship after maxillary dilatation. There was significant reduction in median deviation after treatment.

Class I

Vitral *et al* [14] conducted a study to investigate the relationship between condylar condyles, concentric positions of condylar head and measurable symmetry in the left and right condyle in the patients having Class I malocclusion. They also concluded that there was a statistically significant variation within the cavity of posterior space joint in left and right condyles. The combined value of the posterior joint cavity of the right temporomandibular joint was also high.

Class II Div 1

Pullinger et al[15]concluded that the Class II division 1 Malocclusion sample were characterized by the forward positioning of condyles. Vitral *et al* in his study concluded that in Class II subdivision cases, there was a more forwardly position of condyles both sides.

Class III

Vitral et al. [14] conducted a study to identify changes in class III condyles. No significant changes were found on the surface of the condyle.

TMD and Orthodontics

This case resulted that there was occurrence of TMD in a 16-year-old girl who had undergone orthodontic treatment as well as headgear and extraction of upper first bicuspids to treat Class II div 1 malocclusion. She experienced mild to moderate headache, discomfort in TMJ area after the discontinuation of appliance also. They argued that the discomfort in the TMJ area is because of the over retraction of incisors which causes posterior movement of condylar head and lead to TMJ internal derangements.

TMD and Orthodontic- Evolution of controversies

Orthodontic treatment is also claimed to be able to prevent or cure TMD due to suspected associations between jaw misalignment, occlusal factors, and TMJ disorders. In 1934, there was the starting OD modern history of TMJ disorders. The theory of the treatment conceptions is occlusal imbalance by attaining the absolute relationship between occlusion and skeletal position of the glenoid fossa. Also, some traditional approaches are there which ignore the conception of functional occlusion regarded as triggers for onset and maintenance of TMD symptoms [16]. Within this, over the decades, the research-based diversification issued about the influence of ideal management, strongly supports the neutral effect on the temporomandibular joint and TMD [17].

Recent studies [18-19] on the clear aligners were noticed that there is higher electromyographic activity of mastoid muscle within 6 months of the orthodontic treatment. Also, one month after aggressive orthodontic treatment, they noticed a significant increase in the value of subjects who reported muscular discomfort during awakening, and intensity and number of pain spots seen by palpation of the temporomandibular joint and oral and facial skin. Likewise, latest research has concluded that both passive and active aligners can induce short term mild jaw pin, but subjects enrolled in study, none of them developed significant signs and symptoms of TMD [20].

RELATIONSHIP OF MALOCCLUSION AND TMD

Numerous researches have carried out the interrelationship between morphological and physiological aspects of TMDs. Some studies have shown that there is statistically significant relationship, and other studies have not concluded such associations. The main issue is: within the examiner assigning symptoms to the following medical conditions, failure to separate contributors, or failure to neutralize confounding variables [21].

Other factors of TMD are maxillary anterior protrusion, open bite, maxillary anterior protrusion greater than 7 mm, central displacement (> 2-4 millimeters), and posterior unilateral crossbite with or without side-to-side functional mandibular deviation. Latest literature and verification-based research does not show a formative connection between the occlusal components and the manifestations of TMD[22].

TMD and Functional Appliances:

In a large longitudinal study, Dibbets et al.[23] assessed a longitudinal study consisting 171 patients. Out of which 66 patients were treated with the activator myofunctional appliance, 75 of them were managed with the Begg type of technique in which most of the patients' undergone extractions of teeth as a protocol for the treatment and 30 of them were managed with chin cup therapy. In this, the authors concluded that pre-treatment there were a definite age dependence of the symptoms of TMD by age of ten years which was 10%. After that, the symptoms of TMD were increased by 30% and more than 40 % by the age of 15 years. Researchers concluded that after the treatment, patients who were treated with fixed functional appliances had greater rate of symptoms of TMDs than the fixed functional group patient, but there was no variation found in twenty-year follow-up.

Janson and Hasund [24] assessed a study in Class II div 1 malocclusion young patients inspected five years after retention period. In this study, thirty patients received a double-step management therapy that is activator with headgear treatment followed by fixed orthodontic therapy without tooth extraction, and out of which 30 patients were managed with extraction of all four premolar with fixed orthodontic therapy.30 untreated patients were taken as control group. Approximately 42% of all study participants (treated and untreated) reported one or more symptoms, with same results.In Class II division 1 malocclusion patients, Pancherz [25] used only striped Herbst instruments for 22 adolescents with 6 months treatment period. Once end to end bite achieved, then most of the patients in initial 3 months of the treatment period, experienced tenderness in the muscle.

TMD and Extraction

Sadowsky [26] analysed results from the 160 patients, out of which, 54% were treated with an extraction therapy strategy. After the orthodontic treatment of 87 patients who had extraction of teeth and 68 patients were treated as non-extraction group. He observed that before the orthodontic treatment, 25% of them had joint noise, and out of which 17% had noise after the treatment. Likewise, there was reciprocal clicks noticed in the joint and there were 8% patients noticed clicks after treatment. The author concluded that there was not any progression and severity in the TMD sounds. Kremenak [27] studied 3patients' group, out of which 26 had managed without tooth extraction, 25 of them undergone 4 bicuspids extraction, and 4 of them under gone 2 premolars extraction.

They noticed that there was no statistical differences within the groups among pre- and post-treatment mean scores. A slight but it was a statistically significant improve in score was found after treatment in the non-extracted group and the 4 premolar extraction groups.

ORTHODONTIC MANAGEMENT OF TMD

General considerations

Pain and discomfort are the two principal characteristics of the TMDs. There is also presence of many other clinical signs which can require observation, but these two signs are the most common reasons for which most of the people need clinician help. Lund et al points out, dysfunction is usually the result of discomfort and irritation rather than its etiology, so pain and discomfort should be the main treatment focus. If the pain subsides, then only we expect the other functions expected to improve. The most notable and studied factors for understanding TMD today are genetics, pain affected brain imaging,

endocrinology, behavioural risk factors, sexual dimorphism, psychological characteristics and conditions[28]

Patient self-care and Education

Patients with pain and dysfunction associated with TMD are often worried about what is happening to them, especially if they are believed to have structural problems that require irreversible treatment procedure. Assuming the certain TMD preliminary diagnosis have been made, it is important for orthodontists to mitigate this fear through communication with the patient. However, to smoothly perform this phase of interaction, orthodontists need to be familiar with current TMD concepts. It has been shown that good results can be expected [29].

Instructions for Home care

Voluntary management of TMD by the patient which comprise that he/she can limit the jaw opening while taking food or yawning. Revisiting the orthopedic analogy, orthopedic practitioners need to advice and guide patients on self-care practices. Patients having TMDs should avoid many activities like screaming, eating chewing gum, yawning, singing, and cheerleaders. The patient must follow the proper method of orthopedics and maintain proper posture. Depend upon the severity of signs and symptoms, patient should do changes in his/her diet patterns as they should eat soft food and avoiding of sticky food. Patient should advise self-massage care at home. Occasionally, they should relax their jaws by disocclusion of the teeth with each other. In the extreme cases, patient may seek psychologist help so that their stress can be managed. NSAIDS can also be given to relieve from pain and inflammation.

Splints

Most orthodontists are accustomed to prescribing and using sprints to treat patients with bruxism and temporomandibular disorders. However, we may know that splints are the best treatment option that has happened in the field of TMD and can be worst also if made wrong. Splints have existed in some form for over many years, and thousands of patients have benefited from their help. In some theories, these alterations were considered desirable, probably as they corrected the inaccurate jaw-occlusal relationship. By describing oral instruments and deprogrammers, centric splints or neuromuscular splints are such instruments which look for to achieve a more comfortable jaw position through the use of splint therapy [30].

Occlusal problems need to be fixed and researches from the world have concluded that mechanical treatment to TMD therapy can also be easily recovered by patients. So, most of the latest author is advocated splint therapy for muscle relaxation, loss of oral habits, changes in joint load, and relief of common symptoms[31]. A rough guideline for the oral appliance is they do no injury. This means that they does not cause any unrepairable changes. The major aspect of this conservative view is the avoidance of protocols, including a full 24-hour splint wear. With very uncommon exceptions, the proper procedure for oral instruments was to use them overnight only to allow normal occlusal relationship to be maintained during the day.

CONCLUSION

An Orthodontist should know that how the orthodontic treatment affects individual masticatory system and their function. There is presence of five etiological factors which are connected with TMD. Muscular pain is most usual hurting TMD symptom which is noticed in orthodontics. Most of the TMJ disease signs and symptoms can be treated with a conservative therapy. The main achievement and goal of an orthodontist should be conservation of orthodontic and orthopedics stability in the masticatory region.

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