

# ORTHODONTICS AND TEMPOROMANDIBULAR DISORDERS

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### ABSTRACT:

*Temporomandibular disorders are considered as the main source of pain in the head and neck region which is of non- dental in origin. Its etiology is multifactorial and its pathogenesis has not been completely understood. The interest in the relationship between occlusal factors, orthodontic treatment and TMD has increased over the years. Hence the aim of this article is to review ten association of TMD and orthodontics from the available literature.*

**KEYWORDS:** *Temporomandibular disorders, orthodontics, pain*

### 1. INTRODUCTION:

Temporomandibular disorder (TMD) is normally characterized as an aggregate term that includes various clinical issues that involve the masticatory muscles, the temporomandibular joint (TMJ) and the related structures and forms the most prevalent clinical entity afflicting the masticatory apparatus. The etiology and the pathophysiology of TMD is ineffectively comprehended. It is commonly acknowledged that the etiology of TMD is multifactorial. Among these, occlusion is often referred to as one of the major aetiological components causing TMD<sup>(1)</sup>. Various speculations depend on this assumed affiliation and have defended the use of methodologies like occlusal appliance therapy<sup>(2)</sup>, front repositioning machines<sup>(3)</sup>, occlusal alteration<sup>(4)</sup>, restorative procedures<sup>(5)</sup>, orthodontic<sup>(6)</sup> and orthognathic treatment<sup>(7)</sup>. Alternately, numerous kinds of dental mediations, including routine orthodontic treatment, have been accounted for as reasons for TMD<sup>(8)</sup>. Currently, the possible relationship between orthodontic therapy and TMD signs and symptoms is still a matter of debate among orthodontists, dental community and dental patients. Hence, the aim of this article is to critically review evidence for a possible association between malocclusion, orthodontic treatment and TMD.

## 2. DOES MALOCCLUSION CAUSE TMD?

Ramfjord<sup>(9)</sup> through an electromyographic (EMG) study on 34 patients, stated that ‘The most common occlusal factor in bruxism is a discrepancy between centric relation and centric occlusion; invariably such discrepancy is accompanied by asynchronous contraction or sustained strain in the temporal and masseter muscles during swallowing’. Therefore, he suggested occlusal equilibrium to provide muscular balance and to eliminate the bruxism. However, EMG studies aiming to test this hypothesis by introducing artificial interferences gave inconsistent results<sup>(10-13)</sup>.

Michelotti et al<sup>(14)</sup> carried out in a double-blind crossover design in four different conditions: interference-free condition before the application of any interference, active interference condition, dummy interference condition and interference-free condition after the removal of the interferences. The activity of the masseter muscle was recorded. None of the subjects reported signs and/or symptoms of TMD though the muscle activity was reduced with occlusal interference.

Orthodontists were acquainted with the field of TMD following the hypothesizing of Thompson<sup>(15)</sup> who accepted that malocclusion caused the back and predominant displacement of the condyle. Consequently, there was the need to descend the condyle by liberating the caught up mandible. From that point forward, different malocclusions have been related with TMD signs or indications. But most of the results of the studies conducted couldn't show that orthodontic treatment has a preventive or therapeutic impact on the event of TMD. In this way in spite of the fact that different malocclusions have been related with TMD signs or side effects, the studies are subjected to a lot of bias leading to questionable acceptance of the results. Population study with 3033 subjects was conducted to research the relationship between clicking and crepitus of the TMJ, overjet and overbite<sup>(16)</sup>. The study failed to exhibit a connection between overbite or overjet and TMD.

Among transverse discrepancies, posterior crossbites are said to have a great impact on the TMJ. According to the proposed causal chain of events, posterior crossbite may result in alterations of the disc-condyle relationship, which in turn are responsible for disc displacement and TMJ clicking<sup>(17-20)</sup>. A population based regression analysis of 1291 young adults failed to establish a correlation between cross bites and disc displacement in TMJ<sup>(21)</sup>.

It can be concluded that occlusion is currently declining in importance and is now considered as a cofactor. Other aetiological factors, such as trauma, parafunctional behaviour, psychosocial disorders, gender, genetics and centrally mediated mechanisms, are considered more important.

## 3. DOES ORTHODONTIC TREATMENT CAUSE TMD?

In 1995, a review by McNamara, Seligman and Okeson<sup>(22)</sup> eight conclusions were listed that explains this possible association.

- Signs and symptoms of TMD occur in healthy individuals
- Signs and symptoms of TMD increase with age particularly during adolescence. Thus, TMD that originates during orthodontic treatment may not be related to the treatment.
- Orthodontic treatment performed during adolescence generally does not increase or decrease the chances of developing TMD later in life.
- The extraction of teeth as part of an orthodontic treatment plan does not increase the risk of developing TMD.
- There is no elevated risk for TMD associated with any particular type of orthodontic mechanics.
- Although a stable occlusion is a reasonable orthodontic treatment goal, not achieving a specific gnathologically ideal occlusion does not result in TMD signs and symptoms.
- No method of TM disorder prevention has been demonstrated.
- When more severe TMD signs and symptoms are present, simple treatments can alleviate them in most patients.

In spite of the fact that these conclusions were made 15 years back, most orthodontists and dental network still accept that inside unhinging might be the outcome of the withdrawal of the mandible during a few types of orthodontic treatment <sup>(23)</sup>. This has had a significant sway on the decrease of the extraction rate for orthodontic reason <sup>(24)</sup>

The hypothesis that different orthodontic techniques (e.g. functional appliances, class II/III elastics, chin-cup, headgear, fixed or removable appliances) and treatment plans can be involved as aetiological factors for TMD has also been tested in recent decades.

Henrikson and Nilner <sup>(25)</sup> studied patients between the age group of 11-15 years who underwent orthodontic treatment with untreated controls. In patients with orthodontic treatment the TMD reduced in contrast to the hypothesis. Hence, orthodontic treatment did not increase the risk for or worsen pre-treatment signs of TMD. Rey et al. <sup>(26)</sup> concluded from his study that treatment-induced modifications in the TMJ must be interpreted as remodelling changes. As per current information, the function of orthodontic treatment in the etiology of TMD isn't affirmed. Finally, a 20 year cohort longitudinal study investigating the relationship between orthodontic treatment and TMD concluded that orthodontic treatment neither causes nor prevents TMD and that participants with a history of orthodontic treatment did not have higher risk of new or persistent TMD <sup>(27)</sup>

#### **4. MANAGEMENT OF TMD BEFORE / DURING ORTHODONTIC TREATMENT:**

Before starting orthodontic treatment, it is advisable to perform always a screening examination for the presence of TMD. For medico-legal reasons, any findings, including TMJ sounds, deviation during mandibular movements or pain, should be recorded and updated at 6-month intervals, and informed consent should be signed by the patient <sup>(28,29)</sup>. When a patient reports with facial pain / TMD before the start of treatment, orthodontic treatment should not be initiated as long as the pain is relieved. Once the pain has been resolved and the condition is stable over a reasonable amount of time, initiation of orthodontic therapy may be considered. The treatment plan should always be tailored according to the problem list of the patient, to evidence based dentistry principles and to common sense considering the characteristics of the single patient and taking into account why the patient is seeking treatment.

TMD signs and manifestations are fluctuating and can develop during orthodontic treatment. The orthodontist ought to educate the patient that they are profoundly predominant in the general population and the etiology is multifactorial, it isn't conceivable to build up a connection with the orthodontic treatment. In the event that the patient presents signs or manifestations of TMD during dynamic orthodontic treatment, the initial step is consistently to make the proper diagnosis. The subsequent advance is to stop dynamic orthodontic treatment briefly to dodge compounding factors. Initiating orthodontic forces applies powers to teeth that can cause transient distress or agony. In fact, orthodontic torment incited by methods for separators brought about a transient decrease in the weight torment limits of the masseter also, temporalis muscles <sup>(30)</sup>. The third step is to manage the pain by following traditional recommended methods like pharmacotherapy, social treatment, home activities, active recuperation. A while later, when the patient is relieved of pain orthodontic treatment can be proceeded as already arranged or, if important, adjusted by the patient's condition.

#### **5. CONCLUSION:**

A TMD is a multifactorial pathology, and it is hard to show an immediate connection between one of the causes, for example, occlusion and TMD. It is essential to exclude different reasons for facial pain before examining the teeth as the potential aetiological factor. As indicated by evidence based dentistry, dental specialists should utilize the current best evidence when settling on choices about the treatment of every patient, coordinating individual clinical ability with the best accessible clinical proof.

#### **6. REFERENCES:**

- [1] de Leeuw R (ed) Orofacial pain; guidelines for assessment, diagnosis, and management, 4th edn. Chicago: Quintessence Pub. Co.; 2008, 129–204. 424 A. MICHELOTTI & G. IODICE <sup>a</sup> 2010 Blackwell Publishing Ltd

- [2] Ekberg E, Vallon D, Nilner M. The efficacy of appliance therapy in patients with temporomandibular disorders of mainly myogenous origin. A randomized, controlled, shortterm trial. *J Orofac Pain.* 2003;17:133–139.
- [3] Kurita H, Ohtsuta A, Kurashina K, Kopp S. A study of factors for successful splint capture of anteriorly disc displaced Temporomandibular joint disc with disc repositioning appliance. *J Oral Rehab.* 2001;28:651–657.
- [4] De Boever JA, Carlsson GE, Klineberg IJ. Need for occlusal therapy and prosthodontic treatment in the management of temporomandibular disorders. Part I. Occlusal interferences and occlusal adjustment. *J Oral Rehab.* 2000;27:367–379.
- [5] De Boever JA, Carlsson GE, Klineberg IJ. Need for occlusal therapy and prosthodontic treatment in the management of temporomandibular disorders. Part II. Tooth loss and prosthodontic treatment. *J Oral Rehab.* 2000;27:647–659.
- [6] Sadowsky C, Theisen TA, Sakols EI. Orthodontic treatment and temporomandibular joint sounds – a longitudinal study. *Am J Orthod Dentofacial Orthop.* 1991;99:441–447.
- [7] Egermark I, Blomqvist JE, Cromvik U, Isaksson S. Temporomandibular dysfunction in patients treated with orthodontics in combination with orthognathic surgery. *Eur J Orthod.* 2000;22:537–544.
- [8] Luther F. TMD and occlusion part I. Damned if we do? Occlusion: the interface of dentistry and orthodontics. *Br Dent J.* 2007;13:202–209
- [9] Ramfjord SP. Bruxism, a clinical and electromyographic study. *J Am Dent Assoc.* 1961;62:21–44
- [10] Belser UC, Hannam AG. The influence of altered workingside occlusal guidance on masticatory muscles and related jaw movement. *J Prosthet Dent.* 1985;53:406–413.
- [11] Ikeda T, Nakano M, Bando E, Suzuki A. The effect of light premature occlusal contact on tooth pain threshold in humans. *J Oral Rehabil.* 1998;25:589–595.
- [12] Kobayashi Y. Influences of occlusal interference on human body. *J Int Coll Dent.* 1982;13:56–64.
- [13] McGlynn FD, Bichajian C, Tira DE, Lundeen HC, Mahan PE, Nicholas BV. The effect of experimental stress and experimental occlusal interference on masseteric EMG activity. *J Craniomandib Disord.* 1989;3:87–92
- [14] Michelotti A, Farella M, Gallo LM, Veltri A, Palla S, Martina R. Effect of occlusal interferences on habitual activity of human masseter. *J Dent Res.* 2005;84:644–648
- [15] Thompson JR. Temporomandibular disorders: diagnosis and treatment. In: Sarnat BG, ed. *The temporomandibular joint.* 2nd edn. Springfield, IL: Charles C Thomas; 1964:146–184
- [16] Hirsch C, John MT, Drangsholt MT, Mancl LA. Relationship between overbite/overjet and clicking or crepitus of the temporomandibular joint. *J Orofac Pain.* 2005;19:218– 225
- [17] Wilkinson TM. The lack of correlation between occlusal factors and TMD. In: McNeil C, ed. *Current controversies in temporomandibular disorders.* California: Quintessence Publishing; 1991:90–94.
- [18] Pullinger AG, Seligman DA, Gornbein JA. A multiple logistic regression analysis of the risk and relative odds of temporomandibular disorders as a function of common occlusal features. *J Dent Res.* 1993;72:968–979.
- [19] Egermark I, Magnusson T, Carlsson GE. A 20-year follow-up of signs and symptoms of temporomandibular disorders and malocclusions in participants with and without orthodontic treatment in childhood. *Angle Orthod.* 2003;73:109–115.
- [20] Buranastidporn B, Hisano M, Soma K. Effect of biomechanical disturbance of the temporomandibular joint on the prevalence of internal derangement in mandibular asymmetry. *Eur J Orthod.* 2006;28:199–205.
- [21] 3. Farella M, Michelotti A, Iodice G, Milani S, Martina R. Unilateral posterior crossbite is not associated with TMJ clicking in young adolescents. *J Dent Res.* 2007;86:137–141.
- [22] 0. McNamara JA Jr, Seligman DA, Okeson JP. Occlusion, orthodontic treatment, and temporomandibular disorders: a review. *J Orofac Pain.* 1995;9:73–90.
- [23] McLaughlin RP, Bennett JC. The extraction – nonextraction dilemma as it relates to TMD. *Angle Orthod.* 1995;63:175–186
- [24] O’ Connor BM. Contemporary trends in orthodontic practice: a national survey. *Am J Orthod Dentofacial Orthop.* 1993;103:163–170

- [25] . Henrikson T, Nilner M. Temporomandibular disorders and the need for stomatognathic treatment in orthodontically treated and untreated girls. *Eur J Orthod.* 2000;22:283–292.
- [26] Rey D, Oberti G, Baccetti T. Evaluation of temporomandibular disorders in Class III patients treated with mandibular cervical headgear and fixed appliances. *Am J Orthod Dentofacial Orthop.* 2008;133:379–381.
- [27] . Macfarlane T, Kenealy P, Kingdon A, Mohlin B, Pilley R, Richmond S et al. Twenty-year cohort study of health gain from orthodontic treatment: temporomandibular disorders. *AmJ Orthod Dentofacial Orthop.* 2009;135:692.
- [28] Machen DE. Legal aspects of orthodontic practice: risk management concepts. Excellent diagnostic informed consent practice and record keeping make a difference. *Am J Orthod Dentofacial Orthop.* 1990;98:381–382.
- [29] Machen DE. Legal aspects of orthodontic practice: risk management concepts. Disposing of your orthodontic practice: be careful. *Am J Orthod Dentofacial Orthop.* 1991;99:486–487
- [30] Michelotti A, Farella M, Martina R. Sensory and motor changes of the human jaw muscles during induced orthodontic pain. *Eur J Orthod.* 1999;21:397–404