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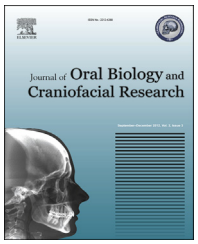

Review Article

Neuromuscular dentistry: Occlusal diseases and posture

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ARTICLE INFO

Article history:
Received 28 January 2013
Accepted 28 March 2013

Keywords:
Neuromuscular dentistry
TMD
Occlusal diseases
Bite disorder
Craniocervical posture

ABSTRACT

Neuromuscular dentistry has been a controversial topic in the field of dentistry and still remains debatable. The issue of good occlusion and sound health has been repeatedly discussed. Sometimes we get complains of sensitive teeth and sometimes of tired facial muscles on getting up in the morning. Owing to the intimate relation of masticatory apparatus with the cranium and cervico-scapular muscular system, the disorders in any system, draw attention from concerned clinicians involved in management, to develop an integrated treatment protocol for the suffering patients. There may be patients reporting to the dental clinics after an occlusal restoration or extraction, having pain in or around the temporomandibular joint, headache or neck pain. Although their esthetic demands must not be undermined during the course of treatment plan, whenever dental treatment of any sort is planned, occlusion/bite should be given prime importance. Very few dentist are able to diagnose the occlusal disease and of those who diagnose many people resort to aggressive treatment modalities. This paper aims to report the signs of occlusal disease, and discuss their association with TMDs and posture.

1. Introduction

Neuromuscular dentistry is the approach in which all the three components like teeth, muscles (associated nerves) and joint, are taken into consideration as an interdependent unit. The goal of every dentist is to preserve the health of the patients' masticatory system, as well as to anticipate the long-term results when restorative treatment is provided. As other fields of medicine are evolving, dentistry should also follow the suite and treatment plan for each patient should be evidence based and must have passed the critical appraisal phase.[1,2] The issue of relationship between dental occlusion, body posture and temporomandibular disorders (TMDs) is a controversial topic in dentistry. In particular, claims for treating TMD according to pathophysiological concepts to correct purported occluso-postural abnormalities seem to be based on doubtful theories. The invasive nature of such treatments requires that these concepts have to be proven with evidence-based data which account properly for the physiology of such relationships.[3] None the less, the role of dental occlusion in the development of TMDs cannot be overruled. During the routine oral examination, the signs and

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2212-4268/$ – see front matter
http://dx.doi.org/10.1016/j.jobcr.2013.03.003

symptoms of occlusal disease must be noted and the patient be educated about the need for further diagnosis and treatment. Better care can be provided to patients if occlusal disease and temporomandibular disorders are detected early and properly treated. Treating occlusal disease can lead to a long, healthy life of the dentition as well as to restorative success.[4–6] In this paper the occlusal diseases and posture that may affect the temporomandibular joint and the neuromuscular apparatus will be discussed in light of research so far.

2. The signs of occlusal disease

There is a very simple and practical approach for assessment of patient with an occlusal disease. If the patient presents with any or more of the following signs and symptoms, we can assume that the patient is having a pathological occlusion:

Pathological occlusal wear and fractures of teeth/restorations is multifactorial, a combination of attrition, abrasion, and erosion and toothpaste abrasive abuse.[7,8] Never the less, whenever excessive wearing out is seen occlusal disorder should be suspected independent of the etiology. Tooth hypermobility and cervical dentin hypersensitivity (CDH) mostly caused by occlusal trauma may be a sign.[9] Fremitus, the vibration felt in teeth when the patients bite on their natural bite or in maximum intercuspal occlusion, may be present. In anterior teeth, this is usually caused by a pathological occlusion, often an envelope-of-function violation. Like hypermobility, it is another sign of a pathological bite. Abfractions are very controversial, no carious lesions are usually caused by pathological lateral forces but, like most diseases processes, these lesions are multifactorial. They cannot occur in the absence of an acidic environment. Of course, the teeth are often attacked by acidic substances like, sodas, energy drinks, fruit juices, coffee, etc.[10–12] Another feature may be vertical bone loss or localized bone destruction (secondary to periodontal disease). It is well established in the literature that tooth mobility accelerates bone loss on periodontally compromised patients.[13,14] Pain and tired facial and masticatory muscles or temporomandibular joint (TMJ) pain is the most common symptom dentist associates with a diagnosis of occlusal disease (OD). Sore and tired facial and masticatory muscles (that can often trigger headaches) are extremely common complaints, when patients are asked. Often, dentists do not know about these symptoms because patients rarely report them. Patients are often not aware that OD can create such symptoms.[4]

Symptoms suffered by a patient of OD are usually as follows: Stiff neck, headache, facial pain, earache, clicking on opening and closing mouth, or even when the symptom has been suffered for too long, it can cause arthritis of the joints. One of the factors that cause this disorder is Occlusal Splint.[15,16] Even if much controversy has been reported regarding the role of occlusion on TMD, there is, however, no doubt that occlusal variables influence natural masticatory muscle function.[17] Mere mentioning of TMD later should not undermine their importance but it is deliberately put at the end because other signs must also get clinician's attention which mostly is overlooked.

Anterior tongue thrusting habit may lead to an altered occlusion as well as disturbed orofacial muscular environment.[18–21] TMJ dysfunctions like disc displacement with reduction (DDR) is frequently associated with a clicking sound and disc displacement without reduction (DDN) is often associated with limitation of jaw opening.[22] DDN may be a more advanced stage of pathology in the TMJ and may progress to osteoarthritis.[23–26]

3. The role of posture

Over the years, a lot of research has been carried out to find the association between posture and occlusion, and the clinical impact. The TMJ is directly related to the cervical and scapular region by an interrelated neuromuscular system. Changes in the cervical spine can cause TMJ disorders and the opposite is also true. Since head and cervical muscles are closely related to the stomatognathic system, studies have been carried out to confirm that postural changes of the head and the body could have an adverse biomechanical effect on the TMJ and lead to TMD.[27,28] Finding appropriate measurement devices and lack of major associations between any occlusal and postural features were the major constraints that prevented from drawing conclusions.[29–31]

An important role is played by neck muscles in maintaining the balance of the head and the muscles of the stomatognathic system, which could be seen as a coordinated system, in which an intervention at any level could result in changes in this complex. Alteration in masticatory muscles can be induced by changes in the head posture and vice versa. Therefore, the manipulation of the muscles of the mandible results in alterations in the usual head posture.[32]

To measure occlusal and posture, several techniques e.g. surface electromyography (sEMG) kinesiography (KG), postural platforms and posturographic devices have been used. But their validity is questioned time and again by the researchers in the TMD field.[33–35] The biomechanical and neurological system with other body system have been discussed and debated by growing number of researchers in the recent years.[36,37]

The association between dental occlusion and head posture has been investigated since early 1990s. Conflicting results have been obtained, some studies showed positive correlations between vertical occlusal dimension and head and cervical posture.[32,38] Gait variations among individuals were observed in association with different mandibular positions,[39] as well as malocclusions associated with abnormal posture.[40,41] Moreover, other authors using a stabilometric footboard, found that occlusal positions affect postural activity significantly. This paved way for further studies,[42–47] in this arena which reinforced the hypothesis that occlusion influences the head and neck posture and also on lumbar spine and leg posture. There is plethora of research that deal with the relationship between the characteristics of the body posture determined by rasterstereographic procedures and certain orofacial–orthopedic parameters. In a study by Lippold et al, for the examination of the dental features, no close correlation between the characteristics of the spine morphology and the overjet were found. The pelvic torsion, the facial axis and the facial depth, the vertical and the sagittal mandibular parameters were in close correlation with the

body posture.[48–50] Also another study failed to reveal any close correlation between the mandibular position and the variables of the kyphotic and the lordotic angle or the pelvic inclination .[51] Skeletal parameters like, the facial axis, the mandibular plane and the facial depth were among the parameters which showed a significant correlation with the degree of the cervical curvature.[52] Similarly, in a study, the facial axis together with the lordotic angle and the pelvic inclination, the inner gonial angle and the mandibular plane with the lordotic angle and the pelvic inclination, as well as the facial depth with the pelvic inclination showed a significant correlation.[42]

Relationship between features of skeletal class II malocclusions and head posture has been described and it is claimed by studies that retruded mandibular position and reduced mandibular length have an effect on craniocervical posture, and there is increased lordosis in these subjects.[53] Also, the degree of cervical lordosis was shown to be associated with vertical craniofacial morphology and anterior overjet, with skeletal class II having an anteriorised and class III a posteriorised head and body posture.[42] In these studies age was not considered as a confounding factor, but the fact is that with age lordosis increases.[54] It was hypothesized that jaw posture may influence muscles and cause postural adaptations at spine level. Unilateral cross-bite has been investigated as a risk factor for asymmetric jaw growth and unbalanced muscle activity.[55] The evidence is lacking whether the uncorrected cross-bite may lead to the development of deformity at spinal level.[56]

Gonzalez and Manns postulated that the Forward Head Position (FHD) is characterized by an extension of the head together with the upper cervical spine (C1–C3), accompanied by a flexion of the lower cervical spine (C4–C7), whereby the cervical curvature is increased, a condition called hyperlordosis. However, it's commonly observed in TMD patients a hyperextension of the upper cervical and a straightening of the lower cervical spine.[57] Posturing training has also been advised by clinicians and Nicolakis et al[58] have designed and implemented a management protocol based on passive mandibular movements, correction of the body posture and relaxation techniques in twenty TMD patients with previous TMJ disk displacement without reduction and according to them promising results have been achieved.

As far as signs of TMDs and occlusal features are concerned literature is little to offer as an evidence to associate certain occlusal features to TMDs[59] and muscle disorders.[60] Occlusal characteristics should be seen as means through which the forces are transmitted to the different structures of the stomatognathic system.[61] Also the presence of an occlusal abnormality may be due to joint degeneration or remodeling resulting in an occlusal shift.[62] Further subjects with TMD history respond in a different manner when compared with the subjects without TMD history. The former are reported to have an increased risk of reporting.[63] From a neuromuscular practitioners perspective it would be important not to use such observations as definitive one. Such reactions may be an acute phase reactions and cannot be compared with TMDs, which have a long-standing history and take years to establish.[64,65]

4. Summary and conclusions

Craniomandibular system is an integral component of the upper body, basically composed of the head, neck and shoulder girdle. In this way TMJ, muscles, ligaments, fascial connections, as well as neural and circulatory innervations are all intimately related. Any dysfunction, occlusal disorder, postural abnormality or trauma of the upper quarter could likely lead to a problem at adjacent or related components. For that reason an evaluation of cervical spine must be carried out to TMD patients.[66] Patients presenting with any of the signs of occlusal disease should be thoroughly examined and cause should be established while treating. Both diagnosing and managing of occlusal disease is important as the treatment of caries and periodontal disease or any other debilitating dental or oral disease. Occlusal disease may have a detrimental effect on the general well being of the patient on the long run. Importantly, the clinicians should never be aggressive while managing the patients reporting with the signs and symptoms of TMDs. Care should be taken while resorting to irreversible occlusal treatments such as orthodontic treatment and prosthodontic and occlusal adjustments, which are recommended on the basis of instrumental assessment of patients with TMD.[33] Conservative treatment modalities, should be practiced and high rate of success has been achieved through the conservative approach also.[67,68] Further studies having sufficient number of cases and controls and especially longitudinal studies are needed to establish the relationship between occlusal features and craniocervical postures and vice versa. Current systemic literature reviews did not support the use of irreversible occlusal therapies for treatment of TMD or/prevention of TMD. Regarding the association between the posture and occlusion and its clinical impact has been carried out. Owing to the close relationship of TMJ with the cervical and scapular region, changes and disorders in both regions can affect each other. There is insufficient research regarding the development of TMDs and poor head posture. The studies showing any association are either weaker in design or there is some methodological constraint in studying posture. More research in this area is needed to establish a link between poor posture and TMDs.

Conflicts of interest

All authors have none to declare.

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