

# Dental occlusion/TMJ and general body health

## Clinical evidence and mechanism of an underestimated relationship

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During the treatment of symptoms originating from disorders of the temporomandibular joint (TMJ) and occlusion, it was found that restoring the TMJ to its normal condition resulted in a change of general body health. In most cases, this change was improved general body health. Owing to similar reports, a connection between TMJ status and general body health was therefore hypothesised. However, the mechanism of this relationship remains unclear.

In this article, the relationships between dental occlusion/TMJ status and general body health are reviewed with reference to peer-reviewed papers. A conceptual theory is proposed that may explain this mechanism.

### TMJ and myofascial pain

Dental occlusion is the relationship between the maxillary and mandibular teeth when they approach each other.<sup>1</sup> The TMJ is the joint of the jaw, which is unique in that it is the only bilateral joint that crosses the midline.<sup>2</sup> As the treatment of dental diseases aims to achieve harmony within the entire stomatognathic system, teeth could be literally considered to be a set of gears anchored in bone, while the upper and lower jaws are attached to each other by the TMJ.<sup>3</sup>

The causes of TMJ disorders can be divided into five categories: dental, trauma, lifestyle habits, stressful social situations and emotional factors.<sup>4</sup> Trauma can be in the form of whiplash, traction appliances and blows to the head, face or jaw.<sup>4</sup> Evidence of significant trauma to the TMJ has also been found following hyperextension of the cervical spine.<sup>5</sup> With regard to habits, bad posture, bad ergonomics at work, oral and

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childhood habits, as well as poor diet and strenuous activities such as heavy lifting, have been cited.<sup>4</sup>

Myofascial pain, deriving from the hyperalgesic trigger points located in skeletal muscle and fascia, is commonly characterised by persistent regional pain.<sup>6</sup> The myofascial component has generally been considered to be part of pain syndromes that involve TMJ. Trigger points in masticatory muscles are presumably caused by malocclusion, misalignment and habitual para-function of the jaws, abnormal head and neck postures, or trauma.<sup>6</sup>

### **Relationship between TMJ and general body health**

There have been several studies on the relationship between occlusion/TMJ and general body health. Among other findings, it has been found that lesions in the masticatory muscles or dento-alveolar ligaments can perturb visual stability and thus generate postural imbalance.<sup>7</sup> The position and functioning of the mandible also have an effect on the centre of gravity.<sup>8,9</sup>

**“...lesions in the masticatory muscles or dento-alveolar ligaments can perturb visual stability.”**

Dental occlusion is associated with reduced lower extremity strength, agility and balance in elderly people.<sup>10</sup> The proper functional occlusion of natural or artificial teeth has been shown to play an important role in generating an adequate postural reflex.<sup>11</sup> The subgroups of general body conditions associated with TMJ may be divided into the following three categories:

#### *Synchronisation of the head and jaw muscles with other muscles*

There is a necessary systematic synchronisation of the head and jaw muscles with the other muscles of the body to maintain proper body posture. The functional coupling of the stomatognathic system with the neck muscles is well known. Patients suffering from occlusal or TMJ disorders have frequently reported dysfunction and pain in their neck muscles.<sup>12,13</sup> An imbalance of sternocleidomastoid muscle activity, often leading to neck pain, can be induced by a unilateral loss of occlusal support.<sup>14</sup>

The biomechanical impact on cervical vertebrae during mastication has been calculated, which confirmed that vertical occlusal alteration can influence stress distribution in the cervical column.<sup>15</sup> Possible associations between trunk and cervical asymmetry and facial symmetry have been reported.<sup>16</sup> For example, it has been found that visual perception control is most important in orienting the head in the frontal plane.<sup>16</sup> A relationship between dental occlusion and postural control has also been postulated.<sup>17</sup>

#### *TMJ and body stability*

Dental occlusion/TMJ condition exerts an influence on body stability. Human beings assume a relatively unstable postural state when in the standing position; therefore, the maintenance of a standing position is related to fluctuation in the centre of gravity, which is controlled by information from the ocular region, the three semicircular canals and anti-gravity muscles.<sup>18</sup>

It has been suggested that occlusion and head position affect the centre of gravity, resulting in an increased risk of falling when abnormal.<sup>19</sup> Poor or absent dental occlusion may decrease proprioception in this area, interfering with the proper stability of the head posture.<sup>7</sup> It is thought that tooth loss is a risk factor for postural instability.<sup>20</sup> Physiologically, mechanical receptors in the periodontal membrane control mandibular movements and coordinate masticatory function,<sup>21</sup> and this is related to the motor activity of the neck muscles.<sup>22</sup>

Fluctuation in the centre of gravity caused by altering the occlusal contact area experimentally was examined experimentally, and the results confirmed that occlusal contact affects gravity fluctuation and that appropriate occlusion attained by maintaining even occlusal contact in the posterior region is crucial for gravity fluctuation.<sup>23</sup>

#### *TMJ and physical performance*

TMJ conditions can influence physical performance. Trainers often advise athletes to wear occlusal splints or mouth guards during competitions in order to increase motor performance.<sup>24</sup> It has also been reported that proper teeth clenching plays an effective role in the enhancement of physical performance.<sup>25</sup>

The relationship between the presence of occlusal support in edentulous subjects and their capacity for physical exercise has been investigated, and it was concluded that reconstruction of occlusal support holds significance not only for the restoration of masticatory function but also for the maintenance of physical exercise.<sup>26</sup>

## **\_Mechanism of relationship between the TMJ and general body health based on the myofascial aspect**

It is the first hypothesis of this article that TMJ and other parts of the body are connected through fasciae, which is a connective element between various anatomical structures,<sup>27</sup> very similar to a three-dimensional network extending throughout the whole body.<sup>28,29</sup> This network can be stretched by the contraction of underlying muscles and transmit tension over a distance.<sup>30,31</sup>

The fascial tissues are arranged vertically, from head to toe, and four interconnected transverse fascial planes criss-cross the body. Therefore, should an injury occur in one part of the body, pain and dysfunction may occur throughout the body.<sup>32</sup>

## **\_Mechanism based on qi and the meridian aspect**

The second hypothesis is that the TMJ and other parts of the body are connected through the meridian system, which is constituted of the fasciae. Traditionally, acupuncture meridians are believed to form a network throughout the body, connecting peripheral tissues to each other.<sup>33</sup> Studies that seek to understand the acupuncture point/meridian systems from a Western perspective have mainly focused on identifying distinct histological features that differentiate acupuncture points from surrounding tissue.<sup>34</sup> One of the histological and anatomical associations with the meridians is intermuscular or intramuscular loose connective tissue (fascia).

Ancient acupuncture texts contain several references to "fat, greasy membranes, fasciae and systems of connecting membranes" through which the qi is believed to flow.<sup>35</sup> In terms of connective tissue associations, several authors have suggested that a connection may exist between the acupuncture meridians, which tend to be located along the fascial planes between muscles or between a muscle and bone or tendon, and the connective tissue.<sup>34,35</sup>

In view of experimental evidence, it has been hypothesised that the network of the meridians can be viewed as a representation of a network of interstitial connective tissues. These findings are supported by ultrasound images showing connective tissue cleavage planes at the acupuncture points in human beings.<sup>34</sup> Rather than viewing acupuncture points as discrete entities, it has been proposed that these points might correspond to sites of convergence in a network of connective tissue permeating the entire body, similar to highway intersections in a network of primary and secondary roads.<sup>34</sup>

## **\_Correlation between trigger points and acupuncture points**

Although separated by two millennia, the traditions of acupuncture and myofascial pain therapies share fundamental similarities in the treatment of pain disorders.<sup>36</sup> Recent reports have suggested substantial anatomic, clinical and physiological overlap of the myofascial trigger points and acupuncture points.<sup>36</sup> The analogy between the trigger points and acupuncture points has been discussed since 1977,<sup>37</sup> when 100% anatomic and 71% clinical pain correspondences for the myofascial trigger points and acupuncture points in the treatment of pain disorders were reported.

A number of similarities between them were also suggested. The two structures have similar locations and needles are used at either point to treat pain. The pain associated with the local twitch response at trigger points is similar to the de qi sensation, and the referred pain generated by needling trigger points is similar to the propagated sensation along the meridians.

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It was pointed out, however, that the acupuncture points located at the trigger points are not frequently used by acupuncturists, and do not share the same clinical indications as the trigger point therapy.<sup>38</sup> It was further argued that the claim of 71% correspondence between the acupuncture points and the trigger points<sup>37</sup> is conceptually impossible. Furthermore, even putting this conceptual problem aside, no more than 40% of the acupuncture points correlated with the treatment for pain and, more likely, only approximately 18 to 19% of the points are actually correlated.<sup>39</sup> The correlation between the trigger points and the acupuncture points clearly need to be further investigated in the future.

The fascial connection theory we propose can explain the functional connection between dental occlusion/TMJ and other parts of the body based on either myofascial release or the qi and meridian system, or a combination of the two. Therefore, dental occlusion should be built up and maintained in a normal natural condition, while causes for deterioration of the TMJ status should be treated in an effort to restore the natural condition.

*Editorial note: This article is a summary of two review papers recently published in the Journal of Alternative and Complementary Medicine 17 (2011): 995–1000 & 1119–24. A complete list of references is available from the authors.*

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