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## Stomatognathic adaptive motor syndrome: A new diagnosis of temporomandibular disorders

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### Abstract

Temporomandibular disorders are the most common symptoms and are often a concept that should not be used as a diagnosis. Temporomandibular disorders (TMD) are a group of conditions that cause abnormal, incomplete, or impaired function of the temporomandibular joint. The etiology or pathophysiology is difficult to understand and largely depends on the anatomical location. It is usually found that the clinical condition reflects a mandibular motor problem rather than a joint problem. The purpose of this study is to determine whether stomatognathic adaptive motor syndrome is a new diagnosis for temporomandibular disorders. Premature or insufficient occlusal contact causes the mandible to move to achieve the ideal intercuspal position, also known as "maximum intercuspal position" (MIP). Therefore, mandibular movement causes condylar displacement, temporomandibular disorder (TMD). Mechanical stress produced by condylar displacement activates Temporomandibular Joint receptors that send information to the trigeminal sensory nucleus and can inhibit catecholaminergic neurotransmission in the basal ganglia. Primary motor response includes increased jaw muscle tone, decreased movement speed, and jaw movement coordination. Excessive muscle activity will lead to adaptive responses in the stomatognathic structure such as hypertonia, pain, fatigue, and weakness in the TMJ region. These include various signs and symptoms such as temporomandibular joint tissue changes, disc changes, and popping sounds. Periodontal membrane thickening, bone loss, and gingival recession leading to tooth loss are symptoms of periodontitis. Patients have otologic complaints such as aural fullness and tinnitus due to involvement of the tensor tympani muscle innervated by the trigeminal nerve.

**Keywords:** Temporomandibular joint, stomatognathic, condyle, masticatory muscles, articular disc

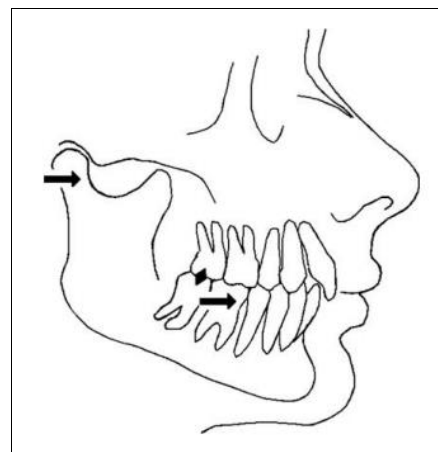
### Introduction

Temporomandibular disorders are a general term to describe several related disorders involving the temporomandibular joint, masticatory muscles, and occlusion [1]. It is not a self-limiting condition and can develop over time with increasing stress levels. Medical and dental conditions which affect temporomandibular joint, Masticatory muscles and contiguous tissue components are known as temporomandibular disorders [2]. The stomatognathic system controls chewing movements, phonetics, sucking, deglutition, salivation, spitting and functions of cheek muscles like blowing, emesis. Therefore, mandibular motor requests are combined with the movement of the tongue, cheeks, soft palate, lips, and other structures, thus allowing all events to be done harmoniously. The mandible is involved in stabilizing the head and maintaining postural balance, because the cervical musculature is antagonist of the mandibular and hyoid muscles. Mandibular movements are made by isotonic contractions of the muscles during speaking, which is accompanied by an increase in tone when the tongue is raised and moved. Teeth affect mandibular movement. The intercuspal position of the maxillary and mandibular teeth mainly affects the jaw movement during chewing [3]. The body's stomatognathic system uses a variety of adaptive processes to maintain proper function. If such adaptive capacity is reduced or insufficient, the system will at some point show not show itself as a sign or symptom and will be elucidate as an illness or dysfunction. This paper is intended to support the supposition that stomatognathic adaptive motor syndrome is a new diagnosis for temporomandibular disorders by trying to demonstrate that the problem is now identified as a motor problem rather than a joint problem.

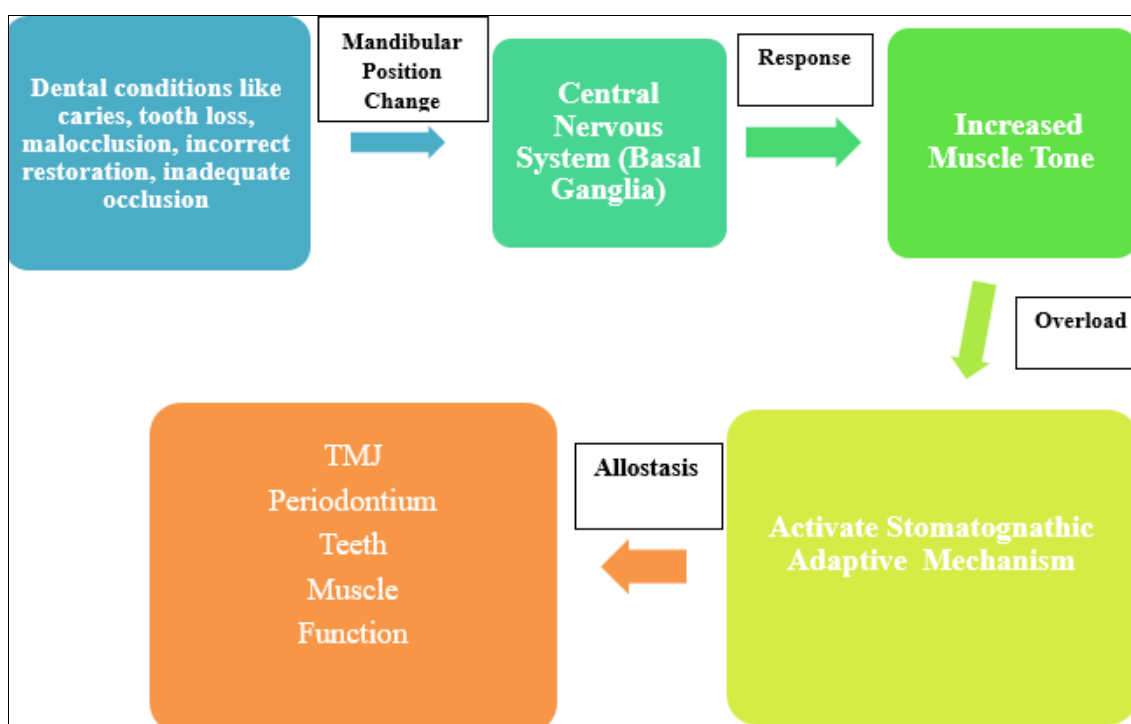
Such motor changes involve the entire stomatognathic system and its function, the signs and symptoms that occur in these cases will be analyzed and the pathophysiology related to the process will be explained.

The mandibular position is independent of tooth contact and it indicates the positioning of the condyle-disc complex inside the glenoid fossa, which is called centric relation. Next comes central occlusion (CO) which is an intercuspal position and it is independent of position of the condyle. This position does not always coincide, but the receptors in the periodontium and TMJ capsule always send signal to that position [4].

A number of dental conditions, including caries, tooth loss, malocclusion, and inadequate occlusion, can cause anterior-posterior differences in mandibular position. Because teeth and bones are in a stable relationship in one bone, when miscommunication occurs, minimal movement is forced to increase the intercuspal position (Figure 1). TMJ capsular mechanoreceptors fire impulses indicating a changed mandibular position, causing a reflex.



**Fig 1:** Inadequate amount of contacts causes decreased movements of mandible to gain better intercuspal position, as condyles and teeth share a fixed relation inside the bone



**Fig 2:** Stomatognathic Motor Adaptive Syndrome

In the central nervous system, the basal ganglia activate the adaptive mechanisms of the stomatognathic system through reflex muscle reactions. The result is less mandibular movement, increased muscle tone, and inconsistent mandibular movement. Late muscle hypertrophy will enable other stomatognathic adaptations mechanism and causes

allostasis, a dynamic process to maintain stability and homeostasis through Change [5], thereby causing changes in other structures such as tissues of temporomandibular joint, cementum, alveolar bone, periodontal ligament, gingival tissue, teeth and muscles

**Table 1:** The structure as well as the signs and symptoms of stomatognathic motor adaptive syndrome

Structure	Signs and Symptoms
Temporomandibular joint	Modification of, Disc alteration, Cracking noise
Periodontal tissues	Broadening of periodontal membrane, loss of bone and gum recession
Tooth	Increased in number of facets, Abrfraction, Restoration or crown fractures
Musculature	Tenderness, increased tone, lethargy, malaise
Function	Loss of speed during chewing and speaking, Uncordinated and uncontrolled tongue/cheek biting, Lateral movements of jaw on speaking
Hearing problems	Sensation of blockage, buzzing sound

It is found that women show more prevalence of symptoms like muscular pain, while males show more dental signs [6].

Thus we can conclude that the temporomandibular disorder are not a problem in joint, but a motor problem that is the

stomatognathic adaptive motor syndrome.



**Fig 3:** Signs and symptoms

### Hypertonia and pain

EMG parameters revealed that patients with hypertonic jaw muscles experienced loss of functional efficiency and fatigue after mastication and occlusion in many studies [7]. Dawson says removing the occlusal barrier provides immediate pain relief [8]. Many studies have shown that using bone broth can reduce muscle pain. A solid piece is placed and the occlusion is adjusted to provide widespread occlusal contact with the mandible in the retracted position. A vacuum is created in the soft tissue maxillary well and the occlusion is not changed. Therefore, the application of hard splint causes the EMG to decrease in the temporalis and masseter muscles, while the application of soft splint causes an increase in the masseter muscles and a very small decrease in the temporalis, suggesting the difference between the two values. In the same patient it is significant. Although hard cleavage is more pain-relieving than soft punching, both have therapeutic effects [9]. Women have a greater prevalence of muscle pain symptoms due to the composition of their muscle fibers and are less resistant to vocal stimulation than men because testosterone has a strong effect on myosin in the jaw muscles. Botulinum toxin A is administered to patients with mandibular muscle pain.

### Tongue bite / cheek bite

Mandibular malposition due to inadequate occlusal contact can cause problems in the execution of motor patterns which are controlled by the basal ganglia, resulting in mandibular-tongue (and/or cheek) misalignment and involuntary biting for example: There is reflex control by the temporomandibular receptor of the genioglossus muscle and the muscle is activated as soon as the mouth is opened [10].

### Speech Mechanics

The movements required to facilitate the production of phonemes in speech kinematics and support the movement of the tongue to produce sound. Thus, disturbances in the stomatological system lead to changes in the phonetic system.

### Otologic symptoms

In 1934, Costen described the relationship between otologic symptoms and mandibular function due to the same embryonic development. The most common symptoms are ear pain, tinnitus, vertigo and aural fullness. Many studies have found that when a patient bites with strong force for more than a minute, there occurs an increase in tinnitus. In patients with otologic symptoms, occlusal treatment to correct the mandibular position results in symptom relief [11]. Patients should undergo occlusal analysis to determine if there is a

difference between habitual occlusal position (HOP) and flat bite plate induced occlusal position (BPOP).

### Periodontal and teeth reactions

When the jaw muscles are hypertonic, it affects the teeth and periodontium [12]. Patients may exhibit two types of allostasis. The first is when the mandible performs rhythmic movements, such as patients with bruxism, which show wearing away of occlusal and incisal surfaces but with very less changes in the periodontal tissues. Another is when movements are very few, but the biting force is very strong. Dental symptoms include pitting, surface wear, abrasion, and non-accidental teeth or fractures in restorations. With or without excessive mobility of tooth, bone loss without inflammation and gum recession, the periodontium will undergo remodelling [13].

### The Temporomandibular Joint

The adaptive remodeling process of tissue response run continuously on the TMJ articular tissue. It is related to the primary function of the mandible: chewing. Many factors are responsible, including intercusp contact, tooth loss, and food hardness. Due to functional adaptation there is activation of chemical and physiological processes which act on synovial membranes, cartilage, and articular discs and can lead to conditions arising from degeneration. The results showed that all tissue elements of the cartilage of the condyles regenerated within 6 months after injury. Glycosaminoglycans are regenerated in early stage and are associated with collagen fibrillogenesis type I. Finally, type II collagen and aggregated proteoglycans collected in 8 weeks postoperatively and overlap with the constitution of the cell layer of condylar cartilage. The regenerated tissue was kept intact for the period under study for upto 1 year [14].

### Anterior disc displacement

Clicking sound from TMJ is common in patients with altered mandibular mobility. Clicking of joint is a physiological phenomenon associated with articular release of many body joints, resulting in increased distance between articular surfaces and increased freedom of movement [15]. Articular release is a physiological phenomenon that may or may not be audible. This happens in patients with healthy joints and in patients with somatic disorders. After articular release, there is a gap in the joint distance, with the release increasing the gap between the articular surfaces. Not all sounds that come from a joint indicates an articular release. Hypotheses are proposed regarding the sounds most commonly associated with this release and include anatomical, physiological, and functional models of articular release. Recurring articular release can reduce the onset of arthritis. Complications of repetitive articular dislocations (eg hypermobility) are also considered.

### Conclusion

From a pathophysiological point of view, the issues identified as temporomandibular disorder is not actually a joint problem, but a stomatognathic adaptive motor syndrome. Apparently, the findings indicate a stomatognathic motor reaction that induces adaptive changes in some stomatognathic structures. An appropriate diagnosis must be made to establish an adequate treatment plan for the patient's well-being.

### Conflict of Interest

Not available

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Not available

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