Temporomandibular Joint Dysfunction: Symptoms, Causes and Treatment

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Abstract: Temporomandibular joint, or TMJ, dysfunction affects between 4 and 28 percent of the population and tends to favor the female gender in a ratio of 4 to 1.¹ Temporomandibular joint dysfunction usually affects people in their twenties to thirties but can affect any age group. Teeth clenching is the most common reason for TMJ dysfunction and since stress levels increase drastically in the 20-30 age group. ² This is often a symptom of stress and can be consciously or unconsciously done. There are many different treatment options and approaches for the treatment of pain and other related symptoms of TMJ dysfunction including chiropractic care, oral surgery, pharmaceuticals, metal hardware, and special braces. This paper is intended to explain the chiropractic role in temporomandibular joint dysfunction treatment as well as other holistic treatment options including the success rate of chiropractic care and co-management treatment.

Data Synthesis: Articles were searched on JMPT as well as a Google search for peer-reviewed articles on Temporomandibular Joint Dysfunction. A review of over 20 articles occurred and conclusions and information were drawn from those articles.

Key Words: Temporomandibular joint, dysfunction, fixation, articular fossa, inhibition, mechanoreception, pain mediation, osteophytosis, biomechanics
**Introduction:** Temporomandibular joint dysfunction affects between 4 and 28 percent of the population and tends to favor the female gender in a ratio of 4 to 1. Temporomandibular joint, or TMJ, dysfunction usually affects people in their twenties to thirties but can affect any age group. Teeth clenching is the most common reason for TMJ dysfunction and since stress levels increase drastically in the 20-30 age group this is often a symptom of stress and can be consciously or unconsciously done. It has been proven through many studies that natural holistic treatment has a very high success rate. Teeth grinding and teeth clenching at night during sleep or at high stress levels during the day is common in the American population and can have many different consequences and side effects. Wearing away of the teeth, joint dysfunction and hypermobility, muscle pain and tenderness, and joint fixation are among the more common side effects and can lead to other pain generators within the spine, mandible, and cranium.

**Temporomandibular joint fixation or dysfunction alters** mechanoreceptive drive for pain mediation and changes the firing patterns for the synergist and antagonist musculature. Although there are a wide variety of treatment options available to patients suffering from TMJ dysfunction most choose to co-manage care between professions and leave oral surgery as a last resort. Chiropractic care, as well as other holistic types of treatment, is proven to be very effective in the treatment of temporomandibular joint dysfunction as well as fast relief of the related symptomatology. Muscle work, acupuncture, resisted
muscle testing, habit correction and diet counseling are among the few natural types of treatment available for the patient that suffers from this type of fixation or malposition. The articular disc that is found within the TMJ is a common reason for the joint subluxation in that it displaces anteriorly very easy. Wide opening of the jaw as in yawning or chewing can cause this disc to displace and noticeable abnormal motion is present as well as pain within the jaw or related areas. The articular disc is susceptible for displacement anteriorly or posteriorly. Since this disc doesn't have a blood supply it is hard for the disc to regenerate itself if the disc has been compressed for a long period of time leading to a longer recovery period. In this situation of chronic displacement the body adapts to the change and manages to have the joint function in a more normal fashion to compensate for the fixation. The pain within the joint comes at such a high rate because the joint itself is lined with a very high level of nerve endings.

**Anatomy and Physiology:** The temporomandibular joint is a gliding hinge joint and is the most constantly used joint in the body. It consists of a condyle, socket and articular fossa. There is a disc made of cartilage that cushions the joint to absorb joint stress and provide proper and smooth motion of the joint. The synovial disc provides the joint with viscous lubrication for the mandible to glide anteriorly. This cartilage can wear to a thin layer when it is subjected to long periods of stress and if joint dysfunction is present under those stressful conditions because there is no direct blood supply that could assist with tissue regeneration like other types of tissue can do. When the joint is in proper motion
the muscles surrounding the joint as well as all surrounding muscles function in a more in sync fashion and reduce the chances for pain generating tissues. The muscles that directly surround the temporomandibular joint are the *temporalis*, *masseters*, *external pterygoid* and *internal pterygoid*. Other muscles that have an effect on the TMJ include the *sternocleidomastoid*, *trapezius*, and the *suboccipital muscles*.

Active ranges of motion of the joint is observed by having the patient open and close the mouth while the observer watches the mandible from the front and the sides as well as the gliding motion of the joint to make sure there is no jerking motion or deviation from midline. Other signs of abnormality would be a decrease in range of motion or abnormal teeth overlap. The TMJ is the most active joint in the body that moves up to 2,000 times each day during swallowing, speech, chewing, yawning and sneezing.³

The external pterygoid muscle, which is the major opener of the mouth, is supplied by the pterygoid branch of the mandibular division of the trigeminal nerve. The masseter and temporalis muscles are also both supplied by the trigeminal nerve and are primary closers of the mandible and require help from the internal pterygoid muscle. The actual capsule of the joint and other structures within the joint are innervated by branches of the temporal nerve as well as filaments of the masseter nerve and a sensory branch of the seventh cranial nerve. The temporomandibular joint is full of nerve endings which makes this joint very painful when any type of fixation, subluxation or dysfunction is present. Therefore, if any of the previous mentioned is present pain may not
only be present within the joint but reflect pain in the surrounding soft tissues and relay into the cervical spine or cause headaches. Reflex aberrant stimulation transmitted downward via the tracts spinalis of the fifth cranial nerve may result in suboccipital and cervical spine migraines caused by asymmetric spasm of the suboccipital muscles and the upper extensions of the cervical multifidi, the spinal erectors in the cervical spine that keep the head upright.

The function of the temporomandibular joint is to allow smooth motion of the jaw while chewing, talking, sneezing, yawning or snoring and allowing breathing to occur through the mouth. For proper motion within the joint to occur, slight extension of the cervical spine will be observed. This allows the joint to open to its maximum opening of 52 millimeters. Other ranges of motion include 8 millimeters of left and right shifting and 12 millimeters of protrusion. While these ranges of motion are being observed auscultation for clicking is being observed by the clinician as well as any deviation within the joint or pain felt by the patient. Palpation of the joint is performed bilaterally on the lateral condyles, superior joint space, posterior joint space, at the angle of the mandible and the coronoid processes. Palpation of the surrounding musculature of the temporalis, masseter, medial and lateral pterygoid, diagastric, sternocleidomastoid, trapezius and posterior cervicalis muscles is performed to identify any trigger points within those muscles or abnormal pain generating tissues. If during jaw distraction pain is felt over the TMJ this can be indicative of capsulitis, or inflammation of the joint capsule. If there is pain when posterior superior pressure is applied this can be indicative of synovitis. The adult range of motion
is usually normal if the examiner is able to fit three finger widths between the patient's incisor teeth and if the patient is able to to jut the jaw forward and place the lower teeth in front of the upper teeth. Restricted ranges of motion can be the result of muscular spasm, inflammatory diseases, scar tissues or congenital defects.

All twelve cranial nerves are in close relation to the temporal bones from which the mandible is suspended. Cranial nerves five and eight, trigeminal and vestibulocochlear, are the nerves that are involved directly or indirectly within the temporomandibular joint and are often aggravated with dysfunction within the joint or muscular hypertonicity and spasm. If there is any deficit in these nerves muscles of the face and neck can be affected and cause dysfunction of joints but causing the muscles to be hypertonic and spasm as well as not function to their full potential. These nerves are not subject to any direct compression by the condyle itself but the joint's proprioceptive bed is highly abundant with nerve endings which cause the patient an extreme amount of discomfort. Distorting effects such as subluxation or fixation can not only cause symptoms within the joint but cause symptoms in the soft tissues associated with the gray cell motor columns of the C1 and C4 neurones. Pain is the number one symptom of actual temporomandibular joint dysfunction and can be seen when pressure is applied to the muscles around the joint and the occipital muscles at the base of the skull as well as direct joint compression. Since slight extension takes place in the cervical spine with opening of the TMJ, muscles of the cervical spine and skull can be affected with pain and other related
symptoms. Muscle spasms within the interrelated musculature can throw off the function of joints and make the ranges of motion hyper or hypomobile. These spasms can cause the cervical spine erectors to not function to their fullest extent and cause the head to fall forward or backwards slightly since the natural action of these muscles is to hold the head in a neutral position. If the head is not at a true neutral position it can cause many other symptoms of pain and subluxation within the cervical spine and upper thoracic spine that the patient may not relate to the true problem. Trigger points within each muscle is also more likely when a muscle is hypertonic or spastic.

**Symptoms of TMJ Dysfunction:** The most common symptoms of temporomandibular joint dysfunction are pain, muscle aches, headaches and joint clicking. A fixation within this joint can cause many symptoms that some people think are unrelated. If the biomechanics are interrupted within the joint it can relay pain into the face, cranium, neck and jaw presenting as headaches, dental pain, muscular spasms, or visual abnormal movements. Cervical spine pain is one of the major complaints in the workforce today aside from low back pain and many different treatments and causes are investigated. Upper cervical subluxations can cause dysfunction in the normal rhythmic motion of the mandible and present itself in the ways described above as well as lead the patient to seek out care for what they think is a different cause. The pain that is actually coming from the temporomandibular joint itself is so intense to the
patient because the joint itself it lined with an extreme amount of nerve endings making any abnormality strikingly painful.

Headaches are a major problem for people who suffer with temporomandibular joint dysfunction. Since all the muscles that surround the jaw are intimately related to those within the cranium and cervical spine tight or hypertonic muscles can cause tension headaches or migraines in the patient. Tension headaches occur because of tight musculature in the cervical spine and occipital regions and have been known to come from facial and cranial musculature as well. There is an estimated 80 percent of the population suffers from tension type headaches at some point in their lives.7 Trigger points within this hypertonic musculature are tender to any slight pressure and when pressure is applied it can cause extreme local pain as well as pain that radiates into the face, shoulders, eyes, or down the spine.

**Cervical Spine Involvement:** The mandible normally moves backwards during cervical extension and forward in cervical flexion. Therefore a patient with subluxations or chronic fixation can exhibit signs of joint dysfunction and malocclusion. Temporomandibular meniscus malposition frequently produces neck pain, suboccipital spasms, and headaches.2 A person with cervical spine fixation will show a consistent state of TMJ dysfunction and can lead to an increase in cervical spine pain and/or increase in mandibular pain in any motion of the TMJ. Also repetitive movements within the joint after it has been dysfunctional or abnormal in any way can cause the joint to adapt to this new
motion and be more difficult to treat. This can also affect muscle strength by inhibiting normal nerve supply or blood supply to the muscles. Upper cervical spine subluxations inhibit the regular extension and flexion of the head and neck and therefore inhibiting the normal functions of the temporomandibular joint since these motions play an intricate role in the motion within the joint. Chronic subluxation can cause long lasting symptoms within the TMJ and be the source of many types of pain from migraines to earaches. Muscular hypertonicity of the cervical spine erectors can also inhibit this chain of motion causing opposing forces to occur within the musculature. If the cervical spine is dyskinetic it will alter the biomechanics of the body.

**Potential or Theoretical Causes of TMJ Dysfunction:** Mechanically, two major forms of TMJ malposition can occur which arises from partial displacement or complete dislocation of the articular disc and usually occurs within 10-12 percent of the population. In 25 percent of patients a history of trauma is elicited and in these cases about 30 percent are iatrogenic as a result from previous procedures that require jaw extension such as tonsillectomy, endoscopy, and molar tooth extraction. In the partial anterior displacement condyle translation is not completely blocked but will produce an opening click of the jaw from the condyle snapping forward into its normal position to allow opening of the mouth. This is the click heard by the patient or observer upon mandible examination. In a complete joint dislocation the disc is usually displaced anteriorly so the translation of the condyle is completely restricted with
the mouth is opened and full opening range of motion is inhibited. Closing and other ranges of motion can also be affected in a complete joint dislocation depending on the patient and circumstance. If this motion is repeated and repeated this can cause osteoarthritis of the TMJ and the joint will adapt to the dysfunction and the ligaments may tear and be drawn into the articular space. The actual temporomandibular joint may be the cause or the effect of pain and other related symptoms. If it falls as the primary source it will fail structurally and functionally but if it is a secondary cause it may be found in remote spots of the body. Local effects of TMJ dysfunction are one sided deviation, joint clicking, dull facial pain, crepitus, and tenderness at the proximal mandible. Remote factors can be unilateral tenderness of the posterior cervical muscles, radiating pain from the TMJ area superiorly or inferiorly to the neck, muscle spasms, migraines or earaches. Since the cranial nerves are in such close relation and connection with the mandible peripheral circulation and parasthesias can be present as a result of fixation or dysfunction. Temporal arteritis, most common in women over 60, produces sharp jaw pain after chewing or talking and can sometimes be confused with a TMJ problem.

Muscular spasms can result in improper function of the spinal erectors and thus lead to fixation of the joint not letting the joint function in its proper ranges of motion resulting in pain. The external pterygoid, internal pterygoid, aster, temporalis, trapezius and mylohyoid muscles are the muscles involved with spasm is the source of TMJ dysfunction. Rhomboid and scalene attachments to the first rib are also commonly tender and hypertonic with there is fixation
present. Muscular strength is tested by placing one hand on the patient's occiput to steady the patient and the other hand, palm up, under the patient's jaw. The patient is then asked to open the mouth while the examiner applies resistance with the palm of their hand. If this isn't possible the examiner should make an attempt to close the patient's mouth passively.

Extreme dental work whether by dentists, orthodontists, or reconstructive surgeons can also be another potential cause of TMJ dysfunction. Pulling teeth or having dental appliances input into the mouth interrupts the normal biomechanics of the jaw and the motions within the jaw. Also, having pain medications prescribed can mask the pain that could be derived from the temporomandibular joint itself. Previous trauma to the face or mandible can cause permanent damage to the joint and alter the normal motion within the jaw. Osteophytes can occur as a result of healing from a traumatic accident, compensation of muscles around the joint, and jerking motions are all possible results from a traumatic incident. In certain situations natural treatment may take longer because of the need to retrain the body towards the normal function.

When the patient has an under bite or over bite this could mean that the patient is having some sort of altered biomechanics or fixation within the TMJ joint. For example, for a person to have an under bite the jaw itself has to be positioned forward so that the bottom teeth fit over the top teeth and this also means that the articular disc that separates bone from bone is displaced posteriorly.
Treatment: Between five to ten percent of the American population suffers from TMJ symptoms that require some form of treatment. The major goals of all types of treatment are to control the pain and reduce the swelling within the joint as well as to prevent further symptoms and inflammation. One type of treatment includes the more holistic approach. Massage therapists and chiropractors are two professions that work towards using a more natural approach to the problem. If soft tissue hypertension is found after examination passive stretching of the jaw can be done by using a mouth prop and slowly inserting layers of tongue blades to open the mouth passively. This technique is observed to be best if the patient is in a non weight bearing position so that no unneeded resistance is applied by the patient. Another stretch would be active stretching in which the patient does the ranges of motion themselves by opening and closing the mouth but not into the painful range of motion. During this exercise the patient is asked to put their tongue at the roof of the mouth as this will minimize jaw protrusion. An adjustment can be made using a low force impulse thrust into the joint to correct any fixation or subluxation. In some situations heat may need to be applied before the adjustment to relax the hypertonic musculature. A technique for mobilizing restricted anterior glide is performed by applying caudal traction along with anterior and posterior glide. This is done by the examiner standing on the opposite side of the patient and grabbing the angle of the mandible and thumb wrapped around the chin with sustained anterior traction and posterior traction while the patient is asked to swallow. These functions are repeated until the
restricted motion improves. This can also be done for restricted lateral to medial glide by standing behind the patient while they are supine and cup your hand around the patient's chin while supporting the patient's head. Slowly apply lateral traction and hold for several seconds and ask the patient to swallow allowing several seconds for relaxation.

Chiropractors can address the problem of TMJ function in many different ways depending on the type of problem and the patient. Some treatments may be favored over others due to patient tolerance of pain and type of injury to the joint. An up and coming treatment for TMJ fixation or subluxation is the ProAdjuster software. This is a unique form of adjusting using a piezoelectric sensor to register the vibrational motion of each segment of the spine. This lays out a precise picture of the rigidity or mobility of each vertebrae for the doctor to assess and use the sensor to adjust the spine. In adjusting the TMJ joint a soft tip is placed on the end of the instrument and the protocol for temporomandibular joint is used. This places short vibrating impulses into the joint restriction and restores it to its proper motion. These short impulses also make the surrounding musculature relax and become less hypertonic. This type of adjusting can be used on all ages and the force is set to each patient's tolerance.

Mandibular dislocation is anterior displacement of the condyle by definition and may involve one or both joints. The patient may present with anxiety or achy spastic musculature surrounding the joint and the mouth cannot be closed. This may be a result of a blunt blow or simply by opening the mouth too wide. The dislocation must be confirmed as uncomplicated by x-ray to make sure higher
measures do not need to be taken. Sometimes the nerves and other structures can be involved to where a reduction isn't the best treatment. An inferior diagonal thrust is made against the molars with the examiner's thumbs while lifting the mandible superiorly with a rotary motion. Chiropractic techniques coupled with the proper orthodontic devices provides the most practical approach to treatment of TMJ dysfunction. This is sometimes thought to be because the dysfunction can affect any part of the body such as the feet, knees, hips, spine, rib cage, and skull. Exercises can be given to the patient against resistance to reduce the amount of muscular spasm and relax the antagonistic musculature. Lateral to medial active ranges of motion movements can be given to the patient to do 10 times daily in groups of 5-10 to improve the range of motion of the joint.

Patient habits are also another factor in the holistic treatment of TMJ dysfunction. Patients should be instructed to reduce the stress levels in their lives and whenever they are noticing that they clench the jaw try to relax the muscles of the jaw and keep their lips together but the teeth slightly apart.

Orthopedic pillows can be used while sleeping to maintain the proper curvature of the spine and avoid sleeping on their stomach where pressure is put upon the side of the jaw. Smoking should be discontinued whether it may be cigarette or pipe to avoid any excessive sucking motion which stresses the jaw. Foods that require lots of chewing should be avoided or foods that require the mouth to open extremely wide. Stretching the muscles too far can cause dislocation of the joint or muscles to become spastic. Acupuncture techniques can treat the trigger points within the musculature of the skull and neck. Usually two treatments are
considered medically necessary but in chronic pain situations more treatment may be indicated. In a pediatric patient the examiner should be alert for non-verbal signs of jaw pain such as rubbing the affected area or making a face while swallowing. A multitude of inflammatory mediators and degradation products have been identified as the generators of TMJ problems and require clinical inspection to diagnose properly.

Pharmacological management of TMJ dysfunction includes non-steroidal anti-inflammatory drugs, or NSAIDS, are used for mild pain and mild to moderate inflammatory conditions. Low dose anti-depressants are sometimes used for the treatment of chronic pain as well as sleep aids. Some drugs such as phenothiazines affect the extrapyramidal tract causing dykinesias. Other therapies including anticonvulsants and sympatholytic agents are considered medically necessary for the pain in this condition.8 Surgical treatment may be necessary when imaging detects an intra-capsular condition or when nerves are being affected in a negative way. Bony ankylosis or hypertrophy can be conditions that would make a surgical treatment necessary. A prosthetic disc is an option for treatment as well as bony filing of the joint if osteoarthritis is present and is a major factor. Condylar and glenoid fossa prostheses and disc tie back procedures are also surgical options to take. Grafts and hardware may be considered upon review of the patient's presentation and imaging and is dealt with on a patient by patient basis. Dentists and orthodontists sometimes pull teeth in order to create space in the jaw or make room for specific braces and hardware and this creates more problems within the mandible as well as a
cosmetic problem for the patient. If teeth are removed then food cannot be chewed as what is normally required to digest food properly. This can be why dietary recommendations are often given to patients with recent teeth removal for TMJ dysfunction as well as the long process of healing within the mouth. Reversible intra-oral appliances may be considered as a repositioning device only in certain cases and are usually used for a duration of 6 months. If indicated for longer than 6 months a full examination is done again and proof of extended use needs to be noted. These devices are intended to stretch the muscles within the jaw and face and lead the joint back into its normal position.

Explaining the disease or dysfunction process is an important aspect in the treatment plan since it has a strong psychological component. Often the pain becomes such a big factor in the patient's life that it affects everyday life including performance at work, eating habits, and sleep habits. These important functions in life are dependent on schedule and the amount per day. Patients may try not to eat as much throughout the day because of the pain and therefore not get the nutrition they need to have a functional healthy lifestyle. If the traditional conservative methods fail then the next step in treatment is arthroscopy. This procedure works in the lysis of adhesions within the capsule and the removal of intracapsular debris. Certain other total joint prostheses may be considered if the joint is abnormal in shape such as having excessive osteoarthritis, or if there is any necrosis of the joint itself on any surface.

In chiropractic treatment of temporomandibular joint dysfunction the treating doctor would first assess the patient's mandible motion by passively
taking the jaw through its normal ranges of motion and then having the patient do the motions actively and with resistance by the examiner. Light palpation of the surrounding musculature will also be assessed for trigger points or hypertonic or wasting musculature. Audibles will also be listened for such as clicking, snapping or grinding within the joint. If clinically indicated by the chiropractor adjustments may be performed. This includes a light impulse thrust into the joint restriction in whichever motion the joint is fixated. Based upon each individual patient the amount of visits per month will be determined and muscular stretches or exercises may be prescribed.

Discussion/Conclusion: Temporomandibular joint dysfunction is a problem that affects a large amount of the population and presents itself in many different ways. Although there are many ways to treat this type of dysfunction the holistic and more natural treatments are the safest and seem to have a large success rate for the patient in the future. This paper describes that this problem that affects a large amount of the population has a high success rate using chiropractic care and a co-management of other natural treatment options. Pharmaceuticals can take the pain away and mask the pain for a short period but will ultimately not treat the true underlying problem. Active and passive stretches of the musculature involved or muscles that have an affect on the TMJ are a great way to start the treatment of the pain symptoms.

A quick assessment of the treating clinician can be performed by grabbing the jaw with both hands with the patient’s mouth open and running it through it’s
normal ranges of motion looking for any restriction or audible click through each range. The chiropractic adjustment can be performed with a gentle thrust into the joint with the line of drive going into the joint the way that it is restricted. In some instances it is important to take x-rays or any other indicated imaging to make sure that adjusting or any other treatment is proper for that patient and the patient's anatomy will not be compromised by performing that treatment. For example, if the nerve or muscular tendons are involved and compromised then a different course of treatment other than adjusting may be required. Another case would be if the condyles have excessive osteophytosis and the adjustment is too painful for the patient or is just not being as effective as hoped. A second treatment plan should always be considered if one should fail.

Holistic more natural treatment is currently being more accepted by the population and is found to have large successful rates. Treating the problem and not just treating the symptoms is one key factor in getting patients well and out of pain.
References


7. The Cleveland Clinic Foundation. 2009. Tension-Type Headaches.


