



Standard of Care: Temporomandibular Joint Disorder

Case Type / Diagnosis: ICD9 codes 784.92, 781.0

Temporomandibular Joint Disorder

The temporomandibular joint (TMJ) is the articulation between the jaw and head.¹ It is the most active joint in the body, opening and closing up to 2,000 times per day to account for a full day's worth of chewing, talking, breathing, swallowing, yawning, and snoring.^{2,3} The jaw, cervical spine, and alignment of the teeth are integrally related. Dysfunction in one of these regions may lead to a TMJ disorder, which is a term used to describe a variety of clinical disorders resulting in jaw pain or dysfunction. TMJ disorder is commonly viewed as a repetitive motion disorder of the masticator structures.⁴ Pain during function or at rest is usually the primary reason patients seek treatment.⁴ Reduction of pain is the primary goal of physical therapy for patients with TMJ.⁴ Patients also seek physical therapy for TMJ locking, masticatory stiffness, limited mandibular range of motion, TMJ dislocation and unexplained change in mouth closing or opening.⁴

The etiology of TMJ disorder is often multifactorial and may be due to stress, jaw malocclusion, habitual activities including bruxism, postural dysfunction, inflammatory conditions and trauma.^{5,6} TMJ disorders are more commonly seen in females most specifically over the age of 55.⁷ Some authors have suggested that there may be a connection between hormones and women and TMJ dysfunction.⁷ It is suspected that 50%-75% of the general population has experienced unilateral TMJ dysfunction on a minimum of one occasion. It is also suspected that at least 33% of people have experienced a minimum of one continuing persistent symptom.

Anatomy and biomechanics of the TMJ

The TMJ is formed by the articulation of the condyle of the mandible with the articular eminence of the temporal bone and an interposed articular disk.⁸ It is a synovial joint with surfaces that are covered by dense collagenous tissue that is considered to be fibrocartilage.⁸ The mandible is the distal or moving segment of the TMJ.⁸ The proximal or stable segment of the TMJ is the temporal bone.⁸ The articular disk allows the surfaces of the TMJ to remain congruent throughout the motion available to the joint.⁸ The primary ligaments of the TMJ are the temporomandibular ligament, stylomandibular ligament and the sphenomandibular ligament.⁸ The loose packed position of TMJ is with the mouth slightly open and the tongue resting on the hard palate. The close-packed position is with the mouth closed with the teeth clenched.⁸ All motions of the TMJ are limited by the temporomandibular ligaments in all directions, and the capsular pattern of restriction is limitation of mouth opening.⁹

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The joint articulation of the TMJ consists of two joint spaces divided by the disk. The lower joint of the TMJ is a hinge joint formed by the anterior surface of the condyle of the mandible and the inferior surface of the articular disk. The upper joint of the TMJ is a gliding joint formed by the articular eminence of the temporal bone and the superior surface of the articular disk. The disk provides three advantages to the TMJ: increased congruence of the joint surfaces, the shape of the disk allows it to conform to the articular surfaces, and self centers itself on the condyle.⁸

The motions available to the TMJ include mouth opening/mandibular depression, mouth elevation/mandibular elevation, jutting the chin forward/ mandibular protrusion, sliding the teeth backwards/ mandibular retrusion and sliding the teeth to either side/ lateral deviation of the mandible.⁸ Mandibular elevation and depression occurs in two sequential phases of rotation and gliding. Mandibular protrusion and retrusion occurs when all points of the mandible move forward at the same amount. This motion is pure translation and occurs in the upper joint alone. During mandibular lateral deviation, one condyle spins around a vertical axis while the other condyle translates forward.⁸

The TMJ is one of the most frequently used joints in the body. Most of the TMJ motions are empty mouth movements, which occur with no resistance from food or contact between the upper and lower teeth. The associated musculature is designed to provide power and intricate control.⁸

Muscle	Action ^{1, 8}
Digastric	Primary muscle for mandibular depression
Medial pterygoid	Mandibular elevation; Assists in protrusion
Lateral pterygoid	Mandibular depression
Temporalis	Mandibular elevation
Masseter	Mandibular protrusion

The TMJ and most of the muscles of mastication are innervated by the mandibular branch of the trigeminal nerve, (cranial nerve V [CN V]). Pain may be referred to adjacent areas on the face in the distribution of CN V.³

The cervical spine and TMJ are connected via muscular attachments. Muscles that attach to the mandible also have attachments to the hyoid bone, cranium and clavicle. These muscles can act upon the mandible, atlanto-occipital joint or the cervical spine. Position of the head and neck can also affect tension of the muscles and therefore affect the position or function of the mandible. It is important to remember to examine the cervical spine in conjunction with the TMJ due to these muscular connections.⁸

Pathology

Basic pathologies of the TMJ involve inflammation and degeneration in arthritic disorders and structural aberrations in growth disorders. Overall, the etiology of the most

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common types of TMJ disorders is complex and still largely unresolved.¹² This list below includes some of the main agreed upon categories of TMJ disorders¹⁰:

- a) Arthritic: Characterized mainly by pain. As the disease progresses symptoms can lead to internal derangement and facial deformity.¹⁰ Painful crepitus or grating sounds is common in patients with TMJ osteoarthritis.¹² Treatment is aimed at controlling risk factors and inflammatory response.¹⁰
- b) Growth disorders: Characterized mainly by facial deformity. Treatment is aimed at removing the tumor and correcting the deformity¹⁰
- c) Non-arthritic disorders: Characterized mainly by mechanical derangement, which can include luxation and acute (traumatic) disc dislocation.¹⁰ Myofascial pain and dysfunction are present due to a primary muscle disorder resulting from oral function habits. Some of the habits can be related to headache, chronic back pain, irritable bowel syndrome, stress, anxiety and depression.¹² Internal derangement refers to a problem with the articular disc with an abnormal position leading to mechanics interference and restriction of mandibular activity.¹² A patient who presents with internal joint derangement will have continuous pain that will be exacerbated by jaw movement. Clicking and locking will result in restricted mandibular opening or deviation of mandibular movements during opening and closing.¹² Treatment is aimed at reducing the mechanical obstruction.¹⁰

In 2010 authors Stedenga et al developed a categorization for TMJ disorder that focuses on intra-articular positional changes of the disc (internal derangement). The authors noted that these internal derangements can explain most of the mechanical manifestations occurring in the joint.¹⁰ This newer classification system seems to further describe the “non arthritic disorders” listed in the list noted above.

- a) Disc derangements, which explains clicking sounds and movement restriction because of the obstruction of condylar movement by the disc¹⁰
- b) Subluxation and luxation of the disc-condyle complex, which represents TMJ hypermobility disorders¹⁰
- c) Adherence, adhesion, and ankylosis of joint surfaces, which results in TMJ hypomobility¹⁰

Indications for Treatment:

1. Pain
2. Clicking, crepitus or popping
3. Decreased ROM in mouth opening
4. Locking of the jaw with mouth opening
5. Difficulty with functional activities of the TMJ: chewing, talking, yawning

Contraindications / Precautions for Treatment:

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Post-operative patients may have surgeon specific precautions regarding physical therapy progression. Contact the surgeon, as appropriate, to clarify case-specific precautions.

Evaluation:

Medical History: Review computerized longitudinal medical record (LMR), review of systems and intake health screening tool.

History of Present Illness: Note course of symptoms and presence of trauma (MVA, assault), previous surgery (dental implants, ORIF), and/or repetitive trauma (see habitual activities below).

Signs and symptoms of TMJ dysfunction are often unilateral but can be bilateral. Clicking may or may not be present at the time of the evaluation. Note any history of clicking and locking. Note current or past use of mouth orthotics or splints, the results and the reason the patient stopped using the appliance, if applicable. Also inquire about nocturnal symptoms and daytime symptoms.⁴ A patient may wake up with TMJ pain which lasts for only minutes to hours, which suggest the nocturnal factors are the primary contributors to the symptoms. Other patients awake symptom free and the TMJ symptoms develop later in the day, suggesting that daytime factors are the primary contributors.⁴ Some patients may have pain during the night and daytime, so both of these symptoms producers need to be considered.⁴ Typically patient may have more pain in the morning and sore teeth due to clenching. There is often a history of stress and difficulty in sleeping.¹²

Social History: Note daily habitual activities such as smoking, bruxism (clenching), chewing gum, snoring, leaning on chin, biting nails, lip biting, clenching teeth, etc. can all contribute to the presenting symptoms. Consider work, household responsibilities, hobbies and/or recreational activities that may involve repetitive stress and sustained postures, e.g. computer work. Emotional stress can trigger nervous habits or poor postural responses, which can lead to TMJ symptoms.³

Medications: Note relevant medications including NSAIDS, muscle relaxants, and other analgesics. Some patients may be taking Amitriptyline, Nortriptyline, or Diazepam before bedtime to reduce EMG activity at the TMJ.⁴

Diagnostic Imaging: Plain film radiography is the gold standard to evaluate the TMJ. A/P and lateral views are used to assess the normal shape and contours of the condyles⁵, the position of the condylar heads in open and closed mouth positions and to measure the amount of movement available.⁵ Periapical images can exclude problems with the teeth.⁶ Magnetic resonance imaging (MRI) can be used to assess the disk position and shape and is used primarily when a nonreducing disk is suspected clinically. Since disk displacement is common in asymptomatic subjects, MRI evidence of disk displacement is not considered significant unless ROM is restricted or a nonreducing disk is suspected clinically.⁶ Computed tomography (CT) and arthroscopy have been advocated but

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ordering these tests should be at the discretion of the specialist oral and maxillofacial surgeons.¹²

Examination

This section is intended to capture the most commonly used assessment tools for this case type/diagnosis. It is not intended to be either inclusive or exclusive of assessment tools.

Observation:

- **Opening and closing of mouth:** Inspect that the teeth normally close symmetrically and that the jaw is normally centered.
- **Alignment of teeth:** Take note of a cross bite, under or over bite. Identify any missing teeth.¹⁷
- **Symmetry of facial structures (eyes, nose, mouth):** Note of any facial deformity which can range from very subtle to severe and readily visible deformation.¹⁰ Examine both soft tissue and bony contours between left and right halves.¹⁷ Pay special attention to muscular paralysis, such as ptosis of the eyelid or drooping of the mouth, which may be associated with Bells Palsy.¹⁷ Also determine whether the upper and lower lip frenulums are properly aligned.¹⁷
- **Posture:** Note the presence of forward head posture, rounded shoulders and scapular protraction.¹⁸ Also be aware of scoliosis or cervical torticollis, which affect the length tension relationships of the muscles attaching to both sides of the mandible causing an uneven pull to one side.¹⁸
- **Breathing pattern:** Assess if diaphragmatic breathing occurs or if there is an accessory pattern to breathing.
- **Tongue:** Examine for presence of bite marks, scalloping (tongue resting between teeth) resulting from tongue not properly resting on the hard palate or from tongue being excessively wide. A dry or white appearance of the tongue is an abnormality and may indicate bacterial infections, dysfunction of salivary glands or adverse reaction to medications.¹⁷

Pain:

The main complaint may include orofacial pain, joint noises, restricted mouth opening or a combination of these.¹² It is helpful to evaluate pain in terms of onset, nature, intensity, site, duration and aggravating and relieving factors. Also consider how the pain relates to features such as joint noise and restricted mandibular movement.¹² Determine which movements cause pain, including opening or closing of mouth, eating, yawning, biting, chewing, swallowing, speaking, or shouting. The patient may also present with headaches and cervical pain. Pain may also be present in the distribution of one of the three branches of the trigeminal nerve (CN V).¹¹ Pain is generally located with the masseter muscle, preauricular area, and anterior temporalis muscle regions. The pain is usually an ache, pressure, or a dull pain which may include a background burning sensation. There may also be episodes of sharp pain and throbbing pain. This pain can be intensified by stress, clenching and eating. Pain may be relieved by relaxing, applying heat to the painful area or taking over the counter analgesics.⁴

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TMJ disorders are distinguished from other possible diseases by the location of pain. TMJ pain is specifically centered in and around the preauricular region and may be accompanied by clicking or grating sounds with mandibular function and restricted mouth opening.¹²

Cervical spine and upper quadrant screen:

Assess cervical and shoulder A/PROM, muscle length including deep cervical flexors, myotomes, dermatomes and reflexes.

Palpation:

- **TMJ:** Palpate the TMJ bilaterally while the patient opens and closes the mouth several times.¹⁸ Assess for joint integrity and structural deviations. The mandibular condyles on both sides should move smoothly and equally.¹⁸ If the examiner feels one side rotate before the other or shift laterally while the mandible is moving, this may indicate TMJ dysfunction.¹⁸
- **Muscles of mastication:** Palpate and compare bilaterally, assess for pain and/or muscle spasm
 - Some of the muscle to be palpated can include: lateral pterygoid (intraorally), insertion of temporalis (intraorally), medial pterygoid (externally), masseter (externally)¹²
 - It is recommended that the masseter, anterior temporalis and TMJs be palpated to ensure that it intensifies or reproduces the patient's pain in order to determine the primary source of pain.⁴ These areas can be palpated by having the patient clench the jaw and palpating the muscle over its origin and muscle belly.¹⁸ Areas of tenderness, trigger points and patterns of pain referrals should be noted.¹² Joint sounds and their location during opening, closing and lateral excursion may be palpated or detected with a stethoscope placed over the preauricular area.¹²

ROM:

AROM: Range of motion can be measured from top tooth edge to bottom tooth edge marking on a tongue depressor and measuring the distance in millimeters.¹⁸

- Opening and closing of mouth
 - Normal opening = 35-50 mm³
 - Functional opening = 25-35 mm or at least two knuckles between teeth³
- Protrusion of mandible
 - Normal = 5 mm³
- Lateral deviation of mandible
 - Normal = 8-10 mm³
- Note asymmetrical movements, snapping, clicking, popping or jumps. Mechanical derangements account for the common clinical signs of clicking and locking.¹⁰
- Record deviations: lateral movements *with* return to midline
- Record deflections: lateral movements *without* return to midline

PROM: Apply overpressure at the end range of AROM to assess end feel

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Strength:

- Deep cervical flexors and scapular stabilizers should be assessed. Refer to a manual muscle testing (MMT) text such as Daniels and Worthingham's Muscle Testing²⁰ or Kendell and Kendell²¹ for complete description of MMT techniques.
- Resisted opening, closing, lateral deviations and protrusion of the jaw should also be tested. Upon testing, the patient should have the mouth open one to two centimeters and therapist should place a stabilizing hand on the forehead.¹⁸ A gradual onset of force should be used so that the patient can resist the motion appropriately.¹⁸ Pain and/or weakness with the resisted testing are positive findings.¹⁸

Sensation:

Assess upper quadrant dermatomes, C1, C2, C3, cutaneous nerve supply of the face, scalp and neck, cranial nerves V – XII.³

Joint sounds:

- Crepitation: A sound that is continuous over a long period of time of jaw movement, like grating or grinding.⁷
- Clicking: A distinct, very brief sound with a clear beginning and end.⁷

Joint mobility:

Caudal traction, ventral glide (protrusion), medial/lateral glide. Refer to joint mobilization texts for appropriate techniques, e.g. Edmond⁹, Maitland¹³

Dynamic loading⁷:

- Load contralateral TMJ - bite on cotton roll.
- Compression of bilateral TMJ – Grasp the mandible bilaterally and tip the mandible down and back to compress the joints.
- Distraction of bilateral TMJ – Grasp the mandible bilaterally, distract both joints at the same time.
- A positive finding to dynamic loading is pain.

Functional Activities:

Assess chewing, swallowing, coughing, and talking. Either have patient demonstrate task or ask for patient's subjective report. Include changes the patient has made to their own diet to accommodate for their pain and dysfunction.

Differential Diagnosis:

Approximately 70% of patients presenting with TMJ disorders also have cervical spine impairments according to Rocabado.¹⁹ It is important to screen the cervical spine and upper quadrant as part of the TMJ evaluation.

Non-musculoskeletal disorders may also cause facial and jaw pain including infection, dental problems including malocclusion, trigeminal neuralgia, parotid gland

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disorder, or other lesions of the face, mouth or jaw. If non-musculoskeletal origin of pain is suspected, refer to the primary care physician for further work-up.

Patients who present with TMJ pain may also have symptoms related to tooth pain. Tooth related pain includes: pain that occurs or intensifies upon drinking hot or cold beverages, throbbing pain that occurs spontaneously, throbbing pain that awakens the patient from sleep. If these symptoms are present, a referral to a Dentist would be appropriate.⁴

Patients with TMJ disorder may also report a feeling of fullness of the ear, tinnitus and/or vague dizziness. These symptoms are seen in approximately 33-40% of patients with TMJ dysfunction and usually resolve after treatment.¹¹

Assessment:

Establish Diagnosis and Need for Skilled Services

Often patients with TMJ dysfunction present with pain, forward head posture, protracted shoulders, mouth and accessory muscle breathing patterns, abnormal resting position of the tongue and mandible, and abnormal swallowing mechanism. Patients with these clinical signs will benefit from skilled physical therapy intervention to correct these upper quarter muscle imbalances and to restore the normal biomechanics and motor control of the TMJ.¹⁹

Problem List:

Potential Impairments:

- Increased pain
- Limited A/PROM
- Impaired posture
- Impaired motor control/strength
- Decreased knowledge of habit modification, relaxation techniques

Potential Functional limitations:

- Inability to chew, cough, sneeze, swallow or talk without pain

Prognosis:

Medlicott and Harris published a systematic review in Physical Therapy July 2006, analyzing 30 research studies that tested the effectiveness of various physical therapy interventions for temporomandibular joint disorder.¹⁴ The authors conclusions and recommendations are as follows:

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1. Active exercises and joint mobilizations, either alone or in combination, may be helpful for mouth opening in patients with acute disk displacement, acute arthritis, or acute or chronic myofascial pain.¹⁴
2. Postural training may be used as an adjunct to other treatment techniques as it's effectiveness alone is not known.¹⁴
3. The inclusion of relaxation techniques, biofeedback, EMG training, proprioception education may be more effective than placebo or occlusal splints in decreasing pain and mouth opening in patients with acute or chronic myofascial pain.¹⁴
4. A combination of active exercises, manual therapy, postural training, and relaxation training may decrease pain and increase mouth opening in patients with acute disk displacement, acute arthritis, or acute myofascial pain. It is not known, however, if combination therapy is more effective than providing a single treatment intervention.¹⁴

A study by Kurita et al explored the natural course of symptoms for patients with internal disk displacement without reduction over a 2.5 year period.¹⁵ They found that approximately 40% of patients were asymptomatic at the end of the study period, 33% of patients had a reduction in symptoms and 25% of patients did not improve. These figures, which show a wide range of results, were similar to another study looking at TMJ outcomes over a one-year time frame and were not dependent on splinting treatment.¹⁶

Some studies suggest that patients with TMJ with cervical or widespread pain will not obtain the same degree of improvement as other patients with TMJ who do not have these pains.⁴

Goals

Short term (2-4 wks) and long term (6-8 wks) goals may include but are not limited to:

1. Reduce or independently self manage pain symptoms or joint noises
2. Normal ROM and sequence of jaw movements
3. Maximize strength and normalize motor control of muscles of mastication, cervical spine and periscapular region
4. Maximize flexibility in related muscles as indicated
5. Maximize postural correction in sitting and/or standing
6. Correct ergonomic set-up of workstations at home and/or at work
7. Independence with home exercise program
8. Independence with relaxation techniques

Age Specific Considerations

Younger women 20-40 years of age are most likely to report TMJ disorder symptoms. Adolescents and elderly men are least likely to report TMJ dysfunction.⁷

Treatment Planning / Interventions

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Established Pathway ___ Yes, see attached. _X_ No

Established Protocol ___ Yes, see attached. _X_ No

Interventions most commonly used for this case type/diagnosis.

This section is intended to capture the most commonly used interventions for this case type/diagnosis. It is not intended to be either inclusive or exclusive of appropriate interventions.

Non-surgical treatments such as counseling, pharmacotherapy and occlusal splint therapy continue to be the most effective way of managing over 80% of patients.¹²

Treatment strategies may include but are not limited to:

- Modalities for pain control: Heat, ice, electrical stimulation, TENS, ultrasound, phonophoresis
- A/AA/PROM
- Stretching: active, assisted and passive stretching, can use tongue depressors or cork as needed. Refer to physical therapy texts for specific techniques.
- Joint mobilization or manipulation: Restore normal joint mechanics of the TMJ, cervical and/or thoracic spine as appropriate. Refer to appropriate texts for treatment techniques.^{9,19, 21}
- Soft tissue mobilization, myofascial release and deep friction massage
- Muscle energy techniques
- Neuromuscular facilitation: hold-relax, contract-relax, alternating isometrics. For specific exercises refer to physical therapy references e.g. Hertling and Kessler's Management of Common Musculoskeletal Disorders.¹⁹
- Relaxation techniques: learning to relax masticatory muscles and maintain this relaxed state during the day; learning stress management and coping skills⁴
- Biofeedback and EMG training to promote muscle control and relaxation⁴
- Therapeutic exercises: Including Rocabado 6 x 6 isometrics program.²² Cervical stability exercises.

Frequency & Duration:

The frequency and duration of follow up treatment sessions will be individualized based on the specific impairments and functional limitations with which the patient presents during the initial evaluation. On average, the frequency may range from 1-2 times per week for 4-6 weeks.

Patient / family education:

- To stop or change poor habits including grinding or clenching teeth. An over-the-counter mouthguard or an occlusal orthotic from the Dentist may be helpful for nighttime use.⁴ The occlusal orthotic can be helpful for masticatory muscle pain, TMJ pain, TMJ noises, restricted jaw mobility, and TMJ dislocation.⁴
- Postural re-education and maintenance correct resting position of the tongue and mandible
- Diaphragmatic breathing

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- Body mechanics training
- Home exercise program instruction

Recommendations and referrals to other providers.

- Speech and Language Pathologist for assessment and treatment of speech or swallowing dysfunction associated with the TMJ dysfunction
- Rheumatologist
- Psychologist/Psychiatrist
- If conservative measures do not alleviate the patient's symptoms, surgical management may be considered. Surgical interventions may include dental implants, condylectomy, condylotomy, ORIF or surgical manipulation. It is beyond the scope of this standard to discuss the specifics of the above listed procedures. Potential surgical referrals could include:
 1. Otolaryngologist (ENT)
 2. Dentist or oral surgeon
 3. Orthopedic surgeon

Re-evaluation / assessment

Reassessment should be completed every thirty days in the outpatient setting unless warranted sooner. Possible triggers for an earlier reassessment include a significant change in status or symptoms, new trauma, plateau in progress and/or failure to respond to therapy.

Discharge Planning

Commonly expected outcomes at discharge:

- Resolution or independent management of pain symptoms
- Functional, active motion of mandible
- Resume normal functional activities with jaw, including chewing and talking
- Modifications of parafunctional or habitual activities that are associated with the cause of the patient's TMJ dysfunction
- Ability to self-correct and maintain normal postural alignment of the head, neck and trunk
- Correct ergonomic set up of workspace
- Independent home exercise program and self progression of program

Patient's discharge instructions

- Home exercise program
- Relaxation techniques
- Habit modification

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