Standard of Care: Temporomandibular Joint Disorder

Case Type / Diagnosis:

Temporomandibular Joint Disorder

The temporomandibular joint (TMJ) is the most active joint in the body as it needs to open and close up to 2000 times per day to account for a full day's worth of chewing, talking, breathing, swallowing, yawning, and snoring.[1,2] The jaw, cervical spine, and alignment of the teeth are integrally related, and dysfunction in one of these regions may lead to a temporomandibular joint (TMJ) disorder, which is a term used to describe a variety of clinical disorders resulting in jaw pain or dysfunction.

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.[3,4] TMJ disorders are more commonly seen in females as compared to males and usually in the age range from 20-40 years.[3]

A brief review of these conditions and the relevant anatomical and biomechanical features will be discussed below. For a complete description of the anatomy, osteokinematics and pathology of these disorders refer to a comprehensive orthopedic and physical therapy reference such as Magee, Saunders, or Hoppenfeld and the review article by Bijjiga-Haff in Orthopaedic Practice in 2006.[1,2,5,6]

Anatomy and biomechanics of the TMJ

The TMJ is a synovial joint with 2 compartments consisting of 2 articulating surfaces and an intraarticular disk. Superiorly, the mandibular fossa of the temporal bone articulates with the disk, and inferiorly, the disk articulates with the condyle of the mandible.[6,7] The loose packed position of TMJ is with the tongue resting on the hard palate, and 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.[8]

Three motions occur at the mandible, depression (during mouth opening), protrusion/retrusion (or protraction/retraction) and lateral excursion (right and left).[6,8] Accessory motions of rotation, which occurs in the inferior portion of the TMJ, and translation (gliding), which occurs in the superior portion of the TMJ, allow for proper function of the joint. Mandibular depression occurs with combined rotation and anterior translation. Rotation accounts for approximately 25 mm and translation accounts for approximately 15 mm of the normal 40

mm of total mouth opening. Protrusion and retrusion occur with translation (and minimal rotation) of the mandibular condyle, while lateral excursion occurs with ipsilateral rotation and contralateral translation of the mandibular condyles.[8] Restoration of these normal accessory motions and joint mechanics is important in the rehabilitation of the TMJ in order to restore functional movements of the jaw.

The TMJ and most of the muscles of mastication are innervated by the mandibular branch of the trigeminal nerve, (cranial nerve V [CN V]); and therefore, pain may be referred to adjacent areas on the face in the distribution of CN V. As an exception, the suprahyoid muscles are innervated by CN V, VII, and XII.

The main muscles of mastication and their primary function include bilaterally:

Masseter – mandibular elevation and protrusion
Temporalis – mandibular elevation and retrusion
Lateral pterygoid – mandibular depression, protrusion, and lateral excursion
Medial pterygoid – mandibular elevation, protrusion, and lateral excursion
Suprahyoids (mylohyoid, stylohyoid, geniohyoid, digastricus) – mandibular depression

Pathology

There are multiple classification systems of TMJ disorders described in the literature, however, most often they can be categorized in the following groups: a) muscle disorders, b) internal disk derangement with or without dislocation of the disk, c) subluxation of the TMJ and d) arthralgias or arthritic conditions.

a) Muscle disorders may include spasm of the masticatory muscles, most frequently involving the lateral pterygoid;[7] fibromyalgia or myofascial pain syndrome; and/or emotional stress/tension which may lead to bruxism.[7] Postural dysfunction, namely forward head posture, may also lead to muscle pain in the jaw from repetitive stress.[3,7]

b) Internal derangement of the disk refers to an abnormal relationship between the function and position of the intraarticular disk and its two articulating surfaces. The classic sign of internal disk derangement is joint clicking, and the most common derangement is an anterior disk dislocation, which can occur with or without reduction of the disk. The signs of an anterior disk dislocation that self-reduce are a loud click or pop with mouth opening and a more subtle click with mouth closing; whereas, the signs of an anterior disk dislocation that does not reduce are an absence of joint noise and restriction of mandibular movements.

c) Subluxation of the TMJ and premature translation of the mandible may also occur and are both usually indicative of poor muscular control or laxity of the articular ligaments. Since translation of the jaw normally occurs after the first 20-25 mm of mouth opening, muscular imbalances can lead to premature translation of the jaw. Both subluxation of the joint itself and premature translation of the mandible can have long term consequences leading to TMJ dysfunction and internal disk derangement if left uncorrected. Predisposition for subluxation may occur as a result of a structural deformity, usually congenital, or alterations in the ligamentous structures. Signs of TMJ subluxation include excessive mandibular opening,

excessive mandibular translation and joint noise at the beginning of mouth closing.[7] Unilateral subluxation will result in a lateral deviation from midline to the contralateral side at the end of mouth opening.[7]

d) Arthritis/arthralgias that affect the TMJ include osteoarthritis (OA), rheumatoid arthritis (RA), juvenile rheumatoid arthritis (JRA), and ankylosis. Up to 50% percent of patients with RA or JRA develop symptoms in the TMJ, and women tend to be more affected than men.[7] Additionally, patients with RA or JRA have a high incidence of cervical spine involvement, and this, in turn, increases their risk of TMJ disorders.

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:

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: Determine 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.

Social History: Daily habitual activities such as smoking, bruxism, chewing gum, snoring, leaning on chin, biting nails, lip biting, clenching teeth, etc. can all contribute to the presenting symptoms. Work, household responsibilities, hobbies and/or recreational activities may involve repetitive stress and sustained postures, e.g. computer work, that contribute to or exacerbate the presenting symptoms. 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.

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 condyles[4], the position of the condylar heads in open and closed mouth positions and to measure the amount of movement available.[4] Periapical images can exclude problems with the teeth.[3] 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 assymptomatic subjects, MRI evidence of disk displacement is not considered significant unless ROM is restricted or a nonreducing disk is suspected clinically.[3]

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: teeth normally close symmetrically, the jaw is normally centered
- Alignment of teeth: note cross bite, under or over bite
- Symmetry of facial structures (eyes, nose, mouth)
- Posture: forward head posture, rounded shoulders and scapular protraction is common
- Breathing pattern: diaphragmatic breathing or accessory pattern

Pain:

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).[10]

Other complaints:

These may include the feeling of fullness of the ear, tinnitus and/or vague dizziness. These symptoms are seen in approximately 33-40% of patients with TMJ and usually resolve after treatment.[10]

Cervical spine and upper quadrant screen:

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

Palpation:

TMJ: compare bilaterally, assess joint integrity and structural deviations
Muscles of mastication: compare bilaterally, assess for pain and/or muscle spasm
lateral pterygoid (intraorally)
insertion of temporalis (intraorally)
medial pterygoid (externally)
masseter (externally)

ROM:

AROM: measure from top tooth edge to bottom tooth edge

- Opening and closing of mouth
  - Normal opening = 35-50 mm
  - Functional opening = 25-35 mm or at least 2 knuckles between teeth
- Protrusion of mandible
  - Normal = 5 mm
- Lateral deviation of mandible
  - Normal = 8-10 mm
- Note assymetrical movements, snapping, clicking, popping or jumps
- 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

Strength:
Assess deep cervical flexors and scapular stabilizers. Refer to a manual muscle testing (MMT) text such as Daniels and Worthingham's Muscle Testing[9] or Kendell and Kendell[11] for complete description of MMT techniques.

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

Joint mobility:
Caudal traction, ventral glide (protrusion), medial/lateral glide. Refer to joint mobilization texts for appropriate techniques, e.g. Edmond[8], Maitland[12]

Dynamic loading[7]:

- 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.
- Positive response 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 Rocobado.[7] 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

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.

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.[7]

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.[13] The authors conclusions and recommendations are as follows:

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.[13]
2. Postural training may be used as an adjunct to other treatment techniques as it's effectiveness alone is not known.[13]
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.[13]
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.[13]

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.[14] 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.[15]

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
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

The most common demographic group affected by TMJ dysfunction is females aged 20-40 years old, however TMJ dysfunction can be diagnosed in both males and females of all age ranges.

Treatment Planning / Interventions

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.

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, 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.[7,8,11]
- 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.[7]
- Relaxation techniques
- Biofeedback and EMG training to promote muscle control and relaxation
- Therapeutic exercises: Including Rocobado 6 x 6 isometrics program.[16]
- Increase awareness of and instruct in changing or stopping poor habits including grinding or clenching teeth. An over-the-counter mouthguard may be helpful for nighttime use.
- Postural re-education and maintenance correct resting position of the tongue and mandible
- Diaphragmatic breathing
- Body mechanics training
- Home exercise program instruction

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
- Home exercise program
- Habit modification
- Postural education
- Body mechanics training
- Relaxation techniques
- Ergonomic recommendations

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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