Citation


Abstract

Patients commonly present to their family physician with signs and symptoms of temporomandibular disorders (TMD's). These patients may report ear discomfort, jaw and/or facial pain, chewing discomfort, joint clicking/popping associated with pain, and/or headache(s). When evaluating a patient with possible temporomandibular dysfunction, screening techniques may be used to help guide family physicians towards proper management and/or referral for treatment of these disorders.

INTRODUCTION

Temporomandibular disorders (TMD) refer to various clinical dysfunctions of the temporomandibular joint (TMJ), muscles of mastication (MOM), and/or associated structures. TMD may be comprised of pathological TMJ sounds, limitation in the range of motion (ROM), and/or facial pain. The etiology of TMD may be multifactorial and knowledge of the anatomy of the TMJ & associated MOM is imperative for the examination and proper diagnosis of TMD (Table 1). A comprehensive approach to treatment is often required for successful management of these patients.

Figure 1

Table 1: Multifactorial Etiologies Of Temporomandibular Disorders.1

<table>
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<th>Parafunctional Habits</th>
<th>Instability of Maxillomandibular relationships</th>
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<td>Emotional Distress</td>
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ANATOMY

The TMJ is unique because it is capable of 2 types of motion. The mandible initially opens with a hinge (rotational) movement and then glides forward or translates along the temporal bone. The joint is superiorly bound by the glenoid fossa that houses the mandibular condylar head with a fibrous capsule lined with synovium. The articular disk and synovial fluid comprise the joint capsule. The articular disk is composed of fibrocartilage, which also covers the articulating surfaces of the TMJ and the disk is described in three different zones: anterior, posterior, and intermediate measuring approximately 3.0mm, 2.0mm, and 1.0mm in width, respectively. The posterior band of the disk, referred to as retrodisclal tissue, is loosely organized and consists of elastic and collagen fibers, nerves, blood, fat, and lymphatics. Several ligaments attach to the disk anteriorly, posteriorly, laterally, medially, and externally.

The muscles of mastication (MOM) associated with the TMJ include the temporalis, masseter, lateral pterygoid, and medial pterygoid (Figures 1, 2, 3).

Figure 2

Figure 1: Lateral aspect of skull. Note the temporalis muscle and origin of the masseter muscle.
Muscle attachments of the temporalis, deep masseter, and superior belly of the lateral pterygoid have been observed within portions of the articular disk anteriorly. Accessory MOM includes the digastric, mylohyoid, geniohyoid, buccinator, stylomandibular, and stylohyoid. Cervical muscles commonly associated with TMD are the sternocleidomastoid, splenius capitus and trapezius.

Occlusion refers to the maximal intercuspation (intimate contact) of the maxillary and mandibular anterior teeth and can be described as being “physiologic” (a.k.a. “functional”) or “pathologic.” When the mandible closes completely and/or moves laterally from maximum intercuspation of the teeth, significant forces may be generated. Missing teeth, loss of tooth contacts, and drifting of teeth can all contribute to the development of a pathologic occlusion.

**HISTORY & EXAMINATION**

There are several critical components to a history and examination of the patient with suspected TMD. The chief complaint and history of the present illness can provide specific information that may aid in diagnosis. The patient with TMD commonly reports pain in front of the ears and temporal region, as well as frequent headaches. Other complaints may include changes in bite, pain in the MOM upon awakening or with chewing, locking episodes, and parafunctional habits (including grinding [bruxism] and/or clenching of the teeth). A screening examination includes evaluation of the range of motion (ROM), muscle of mastication palpation tenderness, joint sounds and tenderness, and dental signs of parafunctional habits. A standard cranial nerve exam should be performed when evaluating patients with possible TMD to exclude tumors and/or other centrally located pathology.

A normal TMJ ROM is measured between the biting surfaces of the maxillary and mandibular anterior teeth. The normal maximum ROM for adults is ≥ 4.0cm. ROM can be estimated by placing individual fingers (average width ~ 1.0-1.5cm) vertically between the biting surfaces mentioned previously. Vertically aligning fingers between the anterior teeth, calculating the number of fingers, and correlating to centimeters gives a gross estimation of the ROM.

Lateral movements of the mandible are referred to as excursions. In order to measure lateral excursions, the patient is asked to separate the teeth and shift the mandible laterally as far as possible to the right and then to the left. A measurement from the midline of the maxillary incisors to the midline of the mandibular incisors is taken. Normal lateral excursions are approximately 1cm to both the right and left. Mandibular deviation from the midline while opening and/or closing should be evaluated as well. Deviation may indicate joint pathology and/or muscle guarding. The presence or absence of joint sounds (clicking, popping and/or crepitus) in the TMJ can be determined with stethoscope auscultation over each joint during active opening and closing jaw movements (Figures 4, 5).
A large majority of the population report joint sounds in the TMJ; however, it is of greater concern when it is symptomatic or painful. Temporomandibular joint tenderness is evaluated by palpation of the pre-auricular and intra-auricular spaces (Figure 6, 7). Several ways to gauge the proper amount of finger pressure used for palpation have been described. Some clinicians choose to establish a baseline response to varying degrees of finger pressure placed on the center of the forehead. After determining the amount of pressure that elicits discomfort in a location that is expected to be non-tender, the clinician can then palpate with an appropriate amount of finger pressure based on each individual patient. TMD research parameters describe using 1 pound of pressure for the TMJ and 2 pounds of pressure for the muscles. A positive response to palpation is significant and noted if localized finger pressure specifically triggers pain or reproduces the reported pain. After TMJ evaluation, the muscles of mastication and associated cervical muscles are examined for tenderness. Extra- orally, the temporalis, masseter, sternocleidomastoid,
digastriics, splenius capitus, and trapezius muscles should be examined. The temporalis muscles should be examined first and this is accomplished via bilateral finger pressure applied to the muscle along the anterior, middle, and posterior portions (Figure 8).

**Figure 9**

Figure 8: Extraoral examination of the temporalis muscle.

The masseter is divided into superficial and deep portions that should be individually palpated (Figure 9).

**Figure 10**

Figure 9: Extraoral examination of the masseter muscle.

Intra-orally, the temporalis insertion, masseter origin, lateral and medial pterygoids are evaluated bilaterally. In order to palpate the temporalis insertion, the patient opens the mouth and a finger is placed on the anterior border of the ramus of the mandible (just lateral and distal to the third molar area). The finger is then moved superiorly until the most superior portion of the anterior border of the ramus is palpated. This is the coronoid process where the temporalis muscle insertion exists. Immediately after palpating the temporalis insertion with the finger in the same location, the patient is asked to move the mandible to the ipsilateral side. After the patient moves the mandible laterally, the finger is moved just lateral and superior-distally, and the lateral pterygoid muscle can be palpatated. In addition, the masseter origin can be palpated by next moving the finger from the lateral pterygoid position in an anterior and superior direction. The masseter originates as a thick tendon from the zygomatic process of the maxilla and from the inferior border of the zygomatic arch. The medial pterygoid muscle (Figure 3) is palpated by having the patient open the mouth, and the examiner places finger pressure in the posterior, floor of the mouth (lateral to the tongue and medial to the mandibular posterior teeth). Intra-oral palpation of the lateral and medial pterygoid muscles is difficult due to limited access. Tenderness elicited with these two specific muscle groups should be interpreted with caution, as an unacceptable rate of false positives can occur.

**IMAGING**

A history and physical exam is generally adequate for family physicians to determine if the patient has TMD. If the physician feels it necessary to image the patient to rule out any central pathology based on their history / physical exam, then they should do so at their clinical discretion. When the physician refers the patient for treatment of TMD, the treating clinician will commonly order diagnostic imaging if progressive pathology and injury are suspected. Common imaging techniques include plain radiographs, including pantomography (Panorex) and open / closed TM joint films, computed tomography (CT), and magnetic resonance imaging (MRI). Other less common techniques include tomography, arthrography, SPECT, and radioisotope scanning. Bony degenerative changes are the most common abnormal finding with TMD patients and are easily seen on a Panorex. In order to assess disk position, the MRI is the imaging technique of choice. CT is used mostly to document degenerative joint disease, fractures, tumors, and ankylosis. All of these imaging studies can be taken with the patient's mouth in an open and then closed position. For the majority of TMD's, diagnostic imaging has not been proven to be a valuable test for directing treatment. These studies do not aid in predicting the outcome and long-term course of TMD's.

**CLASSIFICATION**

TMD's can be classified in several different ways based on signs and symptoms. Muscles of mastication disorders
comprise one category of TMD, including myalgia, myositis, or myofascial pain (MFP). Myalgia is objective pain within a muscle; myositis is acute, constant pain with generalized inflammation and swelling of an entire muscle that usually increases with mandibular movement. 1 Myofascial pain (MFP) is dull, aching regional pain that is referred from or emanating around active trigger points (localized tender points) in muscle, tendon, or fascia. 1 These hyperirritable spots are usually localized within a taut band or bands of skeletal muscle or fascia.

There are several types of joint disorders: capsulitis or synovitis, displaced disk with reduction (DD w / RED), displaced disk without reduction (DD w/o RED), open or closed lock (acute or chronic), osteoarthritis (OA), and ankylosis. 1 Capsulitis or synovitis refers to inflammation of the capsular or synovial lining of the TMJ capsule, ligaments or disk attachments. 1, 5 This includes localized pain at rest that is exacerbated with function and loading of the TMJ. 1 DD w / RED refers to the disk being out of position (usually anterior and medial) in the closed jaw position. Upon opening of the jaw, popping or clicking sounds may be heard and / or palpated, representing the disk returning to its proper location superior to the condyle. DD w/o RED occurs when the disk remains misaligned from the closed position and the patient is unable to maximally open or close the jaw (a.k.a., closed or open lock). A common complaint of patients with DD w/o RED is inability to open or close their jaw upon effort. With unilateral DD w/o RED, the jaw will deviate upon opening to the affected side. Movement of the jaw precipitates pain in the TMJ, and the range of motion and lateral movements are markedly restricted. 1 Studies do suggest that patients assigned a clinical TMJ-related diagnosis of DD w / RED may need to be supplemented by evidence from MRI to determine the functional “disc-condyle relationship”. 5 The studies also report that TMD clinical diagnostic criteria have positive predictive values of DD w / RED ranging from 53.8 - 67%. 6, 7

OA is a degenerative condition that occurs in the TMJ secondary to inflammation of the TMJ. Patients with OA may present with crepitus (“crunchy” sounds) in the TMJ and radiographic evaluation of the TMJ may reveal condylar changes such as osteophyte (bone spur) formation, flattening and sclerosis.

Ankylosis is the stiffening or immobilization of the TMJ with bony union across the joint and usually occurs as a result of trauma, congenital, and/or disease processes. 1 TMJ adhesions are the abnormal fibrous joining of adjacent structures secondary to injury repair/scarring or inflammation within the joint. 1 Maxillomandibular growth disorders include neoplasia, hypertrophy or atrophy, and congenital and developmental dysfunction of the cranial bones and/or MOM. 1

**TREATMENT**

Treatment depends on etiology and specific diagnosis. Myalgia, myositis, and/or myofascial pain are initially treated with a six-component regimen including education, self-care, physiotherapy, intraoral appliance therapy, pharmacotherapy, and behavioral/relaxation techniques. Educating the patient about TMD has been shown in studies to actually improve treatment results. 1 When patients understand that the condition is not life threatening, decreases in overall anxiety and stress has been reported. 1 Educating patients about the self-care techniques includes switching to a soft or no-chew diet and becoming aware of jaw habits or activities that are likely to cause overuse of the TMJ and MOM. Common habits include: clenching the jaws, grinding, jaw posturing, tensing the MOM, and leaning on the jaw. 1 Comprehensive treatment also includes physiotherapy in the form of a home exercise program that the patient performs. Both passive and active stretch exercises are performed twice a day with applications of ice and moist heat.

Intraoral appliance use is a reversible and non-invasive treatment modality that has shown to be effective in treating patients with TMD. Appliances are also known as splints, orthotics, orthopedic appliances, bite guards, or nightguards. 1

There are several options for pharmacologic management of the TMD patient. Initial agents may include mild analgesics, non-steroidal anti-inflammatory drugs. 1 Anxiolytics, tricyclic anti-depressants, and muscle relaxants may be used as adjunctive therapy if initial therapy is not entirely successful in managing TMD pain. 1 Initial dosing of analgesics and/or NSAID's should be on a fixed schedule and irrespective of painful episodes. For NSAID's, a 2 week regimen should be prescribed and assessed for effectiveness. 1 When long-term anti-inflammatory therapy is indicated, Cox-II inhibitors can be prescribed in place of conventional NSAID's. The Cox-II inhibitors are also preferred with those patients who are at a higher risk for gastrointestinal perforations, ulcerations, and bleeds. 1 Centrally acting muscle relaxants depress motor activity and cause sedation.
as a side effect. Common medications include cyclobenzaprine and carisoprodol. These medications are usually prescribed for consumption at nighttime because of the sedative effects. Occasionally, anxiolytics are prescribed additionally at nighttime for those patients with acute exacerbations of muscle pain.¹

Behavioral therapy and relaxation techniques can be professionally supervised and taught. Biofeedback and meditation are just a few of these techniques that may be effective. Depending on the diagnosis, professional physical therapists that are properly trained in passive TMJ therapy can be employed. The literature suggests that symptomatic TMD can respond to physical medicine procedures, but that the outcome depends on the cause of the joint pain.¹⁰ Therefore, not all patients with TMD's are referred for professional physical therapy. Referral to a professional physical therapist is determined on a case-by-case basis.

When patients do not respond to noninvasive TMD therapy, surgical procedures are considered. Initial closed-approach, surgical options include arthrocentesis and arthroscopy of the TMJ's. These are the most simple and least invasive of all the surgical techniques.¹¹ More advanced, open-approach TMJ surgeries include disk repositioning, diskectomy, and modified condylotomy.¹¹ The philosophy of TMJ surgery aims to avoid further harm to the joint, relieve chronic pain, and increase ROM when conservative therapies fail.¹¹

INDICATIONS FOR REFERRAL

When patients present with a complaint of ear pain, jaw pain, difficulty opening the jaw, locking of the jaw, headaches in the temporal region, tooth pain, or tooth/jaw injury, a screening examination should be performed by the family physician to exclude TMD. If the screening examination is positive and TMD is suspected, the patient should be referred to a dentist with expertise in managing patients with TMD. In all cases, it is imperative that systemic / central sources of pain be excluded. Communication between dentist and physician is important for the successful management of a patient with TMD.

CONCLUSION

It is common for patients to present to their family physician with facial pain that requires evaluation for a possible TMD. It is important for physicians to have current knowledge of temporomandibular disorders and be able to perform a basic assessment of patients presenting with possible TMD for proper treatment and / or referral. Acknowledgement to Jay Laudenbach, D.M.D. for his help with photograph reproduction and illustration.

CONTACT INFORMATION

Eric T. Stoopler, DMD Department of Oral Medicine University of Pennsylvania School of Dental Medicine 240 South 40th Street Philadelphia, PA 19104 Phone: (215) 746-0112 Fax: (215) 573-7853 Email: ets@pobox.upenn.edu

References

Author Information

Joel M. Laudenbach, D.M.D.
Fellow, Department of Oral Medicine, University of Pennsylvania School of Dental Medicine

Eric T. Stoopler, D.M.D.
Assistant Professor of Oral Medicine, Department of Oral Medicine, University of Pennsylvania School of Dental Medicine