

Research Paper Review

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Temporomandibular Disorders. Part 1: Anatomy and Examination/Diagnosis Journal of Manual & Manipulative Therapy 2014; 22(1): 2-12.

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ABSTRACT

Temporomandibular disorders (TMD) are a heterogeneous group of diagnoses affecting the temporomandibular joint (TMJ) and surrounding tissues. A variety of methods for evaluating and managing TMD have been proposed within the physical therapy profession but these sources are not peer-reviewed and lack updates from scientific literature. The dental profession has provided peer-reviewed sources that lack thoroughness with respect to the neuromusculoskeletal techniques utilized by physical therapists. The subsequent void creates the need for a thorough, research informed, and peer-reviewed source regarding TMD evaluation and management for physical therapists. This paper is the first part in a two-part series that seeks to fill the current void by providing a brief but comprehensive outline for clinicians seeking to provide services for patients with TMD. Part one focuses on anatomy and pathology, arthro- and osteokinematics, epidemiology, history taking, and physical examination as they relate to TMD. An appreciation of the anatomical and mechanical features associated with the TMJ can serve as a foundation for understanding a patient's clinical presentation. Performance of a thorough patient history and clinical examination can guide the clinician toward an improved diagnostic process.

ANALYSIS

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Background Information

The temporomandibular joint (TMJ), long known as a source of pathology (1), only became a focus of research in the last few decades. Treated commonly by dentists and rehabilitation specialists (PT, DC), the collective group of dysfunctions affecting the TMJ are known as temporomandibular disorders (TMD).

The dental literature provides peer-reviewed evidence regarding treatment of TMD, but lacks thoroughness regarding musculoskeletal techniques available for treating this condition. The body

of evidence in the physical therapy and/or chiropractic literature is also lacking regarding treatment of TMD and is generally not up to date on this subject. These authors sought to provide clinicians with clarity on the subject of TMD by compiling a comprehensive clinical review, presented as a two-manuscript series. This information is summarized as two separate reviews. This first review addresses relevant anatomy and epidemiology, presents the examination process, and discusses differential diagnoses. The second review will address conservative management of TMD.

SUMMARY

Review of Anatomy

The TMJ is located anterior to the external auditory meatus and is composed of the temporalis bone and the mandible. Key aspects of TMJ anatomy include: a biconcave intra-articular disc, dividing the joint capsule into upper (discotemperal) and lower (discomandibular) regions; and a group of contractile tissues which comprise the muscles of mastication. The mandibular condyle demonstrates variability in shape (2) and can be asymmetrical side-to-side, while variations in condylar shape can increase under pathological circumstances. The possible variations in mandibular and condylar shape result in greater heterogeneity of design than in other joints and add to the difficulty in treating this area.



The articular surfaces of the TMJ are highly incongruent and are lined with fibrocartilage, not hyaline cartilage like other synovial joints (3). While the entire joint is subject to degenerative changes, the lower portion tends to be more vulnerable to these changes than the upper portion. No relationship has been established between degenerative changes seen on radiographic examination and verbal reports of TMJ pain, palpable tenderness, mandibular mobility and pressure pain thresholds (4). The intra-articular disc is subject to complicated movement and has attachments to both the medial and lateral aspects of the mandibular condyle, as well as to the surrounding ligamentous and muscular tissues, resulting in the disc and condyle moving together under the temporal bone when tissue is taut. The disc also connects anteriorly to the capsule and posteriorly to the retrodiscal tissue. These multiple attachments result in potential displacement of the disc in anterior, medial, lateral, or posterior directions. However, a correlation of disc position and degenerative changes has thus far not been established (5).

The TMJ, as a synovial joint, is lined with a synovial membrane and contains synovial fluid. It also possesses a lateral ligamentous thickening that provides reinforcement to the joint. Under normal circumstances, the capsule of the lower joint space does not extend past the mandibular condyle. As such, the upper joint space extends farther forward than the lower joint space, which is reflective of the arthrokinematic rolling in place of the lower joint space, versus the anterior translation movement in the upper joint space.

Head, facial and cervical spine muscles all contribute to TMJ movement. The muscles of mastication are the primary muscles associated with the TMJ, generally divided into opener or closer categories. Primary openers include the lateral pterygoid, geniohyoid, mylohyoid and digastric muscles. Primary closers include the temporalis, masseter and medial pterygoids. These muscles are responsible for the myalgia that is often closely associated with TMD and are related to either parafunctional habits (e.g. teeth grinding) and/or the formation of myofascial trigger points in the relevant musculature.

Arthro- & Osteokinematics

The TMJ is known as a hinge and sliding joint (6) but also utilizes spinning and compression movements (7). The right and left joints act synergistically to move the semi-rigid mandible relative to the maxilla, temporal bone and cranium. On mouth opening, a combination of rotation and anterior translation occurs, with the discomandibular rotation occurring first, followed by the discotemporal motion translation. Condylar head movement during lateral deviation is complex and involves ipsilateral lateral rotation (spinning) with contralateral anterior translation and medial rotation (8, 9). Temporomandibular protrusion appears to be as simple as bilateral anterior translation of the mandibular condyles, although there is a lack of evidence available to confirm this suggestion.

Epidemiology

Estimates of TMD prevalence range from 5 to 60%, with the variation largely due to the heterogeneity of diagnostic qualifications and investigative designs used. A recent meta-analysis estimated management needs for TMD in adults at 16% (10). Progression to severe pain and recovery from frequent symptoms are equally rare in the majority of cases.

Diagnostic Classifications

The diagnostic process for TMD was standardized in 1992 with the release of the research diagnostic criteria for TMD (RDC/TMD) (11). These criteria were updated in 2010 (12). The RDC/TMD categorizes disorders simply and has been validated. The criteria are widely used by researchers, although critics cite the limited nature of the categories and the lack of inclusion of pain science as drawbacks. The diagnostic classifications and clinical patterns are outlined in a separate section below.

Patient History

On patient history, the exact symptom location, pain intensity ratings, symptom type, symptom behaviour and related areas of involvement are all importance when attempting to arrive at a diagnosis. Any previous treatment for the condition should be elucidated, as should any information regarding corrective equipment utilization, including those used to alter the position of teeth, regional trauma, parafunctional habits, the presence and/or progression of joint noises, the patterns of symptom provocation and alleviation with respect to activity participation and/or time of day, and whether symptoms are improving, getting worse, or staying the same.

Patients should be screened for the presence of red flags, including:

- a history of emotional or psychological stress
- medication usage
- symptoms of vertebrobasilar insufficiency
- upper cervical spine instability
- cardiac dysfunction
- central nervous system dysfunction
- cranial nerve dysfunction
- infection
- unexpected weight loss or gain

Clinical Examination

Observation

Important aspects for observation include:

- general postural deficits
- relative prominence of the facial and neck musculature
- gross mandibular size and shape
- regional symmetry
- mandibular resting position
- both skin temperature and colour
- abnormalities of the oral structures
- condition of extra-oral structures (e.g. arteries, veins, lymph nodes, etc.)

Active ROM Testing

Active range-of-motion testing includes mouth opening, right and left lateral deviation, and protrusion. Interincisor distance is the most commonly used method for measuring opening. Measurement of lateral displacement is often more difficult due to challenges associated with stabilizing measurement tools against the teeth during lateral motion. Simply using a line-of-sight approach relative to the frenula is often the more practical solution.

Passive Accessory Movement Testing

Accessory movement testing includes distraction, anterior glide, medial/lateral glide, and caudal/anterior/medial (CAM) glide of each mandibular head and sometimes requires intraoral placement of a digit or thumb. Testing these movements generally involves stabilizing the head with the non-dominant hand and passively moving the mandible with the dominant hand, to determine the extent of movement and end-feel. Each joint is tested separately, with the contralateral joint stabilized to the best of the clinician's ability.

Special Testing

Special testing is generally limited in TMD patients. Mandibular fractures can be broadly ruled out using the *tongue depressor test*: the patient bites down unilaterally on the tongue depressor and the examiner rotates the tongue depressor, attempting to break it. If the patient is unable to hold pressure without pain, they are referred for radiographic examination. Breakage of the tongue depressor indicates no fracture and no need for plain films. The *joint compression test* involves posterior and cranial pressure on the mandibular head, moving it towards the articular surface of the temporal bone. This test evaluates the status of the intra-articular surfaces.

Manual Muscle Testing

The traditional manual muscle testing scale has little objective applicability with respect to TMD.

Quantitative Sensory Testing

Quantitative sensory testing can help differentiate between patients with a recurrent or nociceptive condition and those with a chronic or neuropathic condition. It can include testing of pain pressure threshold, mechanical allodynia and mechanical detection threshold, and vibration detection threshold (13), although it is not necessary in all TMD patients. Testing should be focused on those patients who report widespread, pain-dominant conditions that are likely to be chronic in nature and possess irritable symptoms.

Palpation

Relevant considerations during palpation include:

- symptom provocation at the TMJ line
- abnormalities in mandibular head movement
- hypersensitivity of the retrodiscal tissue (palpated with an open mouth)
- crepitus
- popping or clicking
- regional tenderness
- regional myofascial trigger points
- changes in mass of the masseter, temporalis, pterygoids, and cervical spine muscles

Interpretation of Clinical Examination

Following a comprehensive examination, the following should be considered regarding initiation of treatment:

- Were any red flags noted? If so, referral for medical consultation is recommended.
- How irritable are the patient's symptoms? If highly irritable, a cautious approach to treatment should be taken.
- Did clinical testing identify limited motion? TMD motion limitations are often associated with a firm end-feel, indicating capsular restriction, disc displacement, and/or guarding.
- What type of impairment does the most painful test point to? Muscular pathologies respond well to palpation of the affected muscle. In capsular restriction, passive accessory testing may be the most common pain generator.

Clinical Patterns & Diagnosis of TMD

Myogenic

Associated with stress, anxiety, clenching, bruxism; secondary component to all other forms of TMD; palpable muscle tenderness; often bilateral; provoked by activity (clenching, chewing, bruxism); confirmed by muscular management techniques and patient education regarding stress and other contributing factors.

Arthrogenic

Associated with joint line pain, arthritis or arthrosis, arthralgia, hypermobility, and joint pain with movement; palpable joint line tenderness; crepitus; positive joint compression test; accessory movement irregularities; confirmed through joint mobilization techniques, or patient education regarding joint hypermobility.

Disc Displacement with Reduction

Associated with joint noises (popping/clicking) and blocked opening; may resolve spontaneously; opening and/or reciprocal noise; generally no severe locking; positive joint compression test; generally unilateral; confirmed through response to joint interventions.

Disc Displacement without Reduction

Associated with blocked opening possible history of displacement with reduction; may have a history of opening and/or reciprocal noise; locking that does not permit functional range; positive joint compression test; generally unilateral; confirmed through response to joint interventions.

Cervical Spine Involvement

Generally present in all TMD cases; presence of upper cervical spine or head pain; accessory movement restrictions; unilateral or bilateral; multiple levels may be involved; confirmed with joint interventions.

CLINICAL APPLICATION & CONCLUSIONS

Diagnosis and treatment of TMJ disorders can be difficult and requires comprehensive examination and patient history to properly identify the correct diagnosis. In part 1 of this 2-part series, the authors reviewed the anatomy, pathophysiology and examination findings, with a focus on rehabilitation. In part 2, they address conservative management strategies, including modalities, patient education, therapeutic exercise, soft tissue techniques, joint mobilization, and oral splints.

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