

Chapter 6

TEMPOROMANDIBULAR DYSFUNCTION ASSESSMENT AND INTERVENTION

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REFERENCES

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INTRODUCTION

Temporomandibular disorders (TMDs) are defined as a subgroup of craniofacial pain problems that involve the temporomandibular joint (TMJ), muscles of mastication, and associated musculo-skeletal structures of the head and neck.¹ In addition to pain, limited mandibular motion, and joint sounds, common symptoms can include ear pain and stuffiness, tinnitus, dizziness, neck pain, and headache.

At least one sign of TMD is reported in 40% to 75% of adults in the United States.¹ Although up to 40% of those who experience signs and symptoms of TMD show spontaneous resolution of their symptoms,¹ patients with posttraumatic TMD may differ to a small extent from those with nontraumatic disorders on reaction-time testing, neuropsychological testing, and clinical testing of TMD.² TMD may contribute to posttraumatic headache.³

A very basic measurement for TMD dysfunction that may be applied by a generalist therapist is a measure of pain-free mouth opening (maximal incisal opening). Typically, a therapist who specializes in TMD uses a complete physical assessment of the TMJ and surrounding musculature, such as the Temporomandibular Index, which combines the functional indices in a total score.⁴ Additional measures of pain and of functional limitation brought on by TMD are recommended.^{4,6} The Jaw Functional Limitation Scale (JFLS) is a joint-specific patient self-report designed to test a patient's functional level.^{6,7} Although it is not yet specifically tested in persons with TMD, the Patient-Specific Functional Scale (see Chapter

5: Posttraumatic Headache Assessment and Intervention), a patient-specific outcome measure that investigates functional status,⁸⁻¹² may be considered for use in this population. An option for a quick method of measuring subjective pain intensity that may or may not be context specific is the Numeric Pain Rating Scale (see Chapter 5: Posttraumatic Headache Assessment and Intervention), which can be administered either by a therapist or used as a self-report tool.^{13,14}

Although no studies that specifically address interventions for TMD that occur as a result of MTBI were found, several systematic reviews of TMD interventions support symptom management using a multimodal approach.^{1,15-17} The majority of individuals with TMD respond to symptom management techniques, but for those who experience chronic pain, referral to and collaboration with dentists, a multidisciplinary chronic pain center, or both may be needed.

This section of the toolkit provides a limited number of assessments for the generalist therapist, along with suggestions for conservative interventions for service members with TMD. Although a specific physical assessment format is not included here, a standardized physical assessment of joint and muscles⁴ that is used consistently is recommended. The other assessments included here are considered **practice options** and are focused on functional limitations and pain that may occur in those with TMD issues. Initial conservative intervention suggestions are considered **practice standards** based on a number of systematic reviews.^{15,16}

SECTION 1: ASSESSMENT

INTRODUCTION

A complete evaluation of TMD involves a physical assessment of the TMJ as well as of the surrounding musculature. A TMD specialist may use a valid and reliable assessment tool, such as the Temporomandibular Index.⁴ The generalist therapist may begin by using a measure of maximal voluntary mandibular opening, which is obtained by measuring between the maxillary and mandibular incisal edges with a ruler scaled in millimeters. According to Higbie et al, the "internationally accepted norms for vertical mandibular opening

in healthy adults 18 to 60 years of age have been reported to be between 36 and 68 mm of opening at the incisal edge."¹⁸ Head position is an important factor in the amount of vertical mandibular opening available¹⁸ and should be tested consistently. Some complete assessment tools consider the range of motion for vertical mandibular opening as normal if it is greater than or equal to 40 mm.⁴ Additional measures of functional limitation and pain are used to assess and follow change over time in individuals with TMD.

THE JAW FUNCTIONAL LIMITATION SCALE

Purpose/Description

The JFLS is a patient self-report questionnaire designed to assess a patient's functional level that is both joint-specific and separate from pain-related disability (Form 6-1).^{6,7} It has a total of 20 items that address three levels of functional limitation including mastication (6 items), jaw mobility (4 items), and verbal and emotional expression (10 items). There is also an eight-item version that measures global functional limitation of the jaw. Each item is rated on a numerical rating scale of 0 to 10 (0 indicates no limitation; 10 indicates severe limitation).

Recommended Instrument Use

The eight-item scale has been shown to be sensitive to change following short-term interventions, but the developers assume that the 20-item scale will also be sensitive to change because it contains more focused items that correlated with the eight-item version.⁶ The developers recommend that the 20-item scale be used to evaluate the effects of interventions on individual clients. These scales should be used in conjunction with a standard physical therapy evaluation of jaw mobility and muscle performance.

Administration Protocol/Equipment/Time

This is a pencil-and-paper test that the client can fill out in less than 5 minutes. The eight-item version is a global scale; the 20-item version is better for individual assessment.

Groups Tested With This Measure

Five diagnostic groups were included in research studies, including TMD, primary Sjogren's syndrome, burning mouth syndrome, skeletal malocclusion, and healthy controls.^{6,7} Items from two other self-report measures were studied to develop a new scale related to jaw-specific limitations that were separate from disability and pain behaviors. Most of the subjects were females with an age range from 10–93 years.

Interpretability

Norms: not available
Minimal Detectable Change (MDC): not available.

If the patient's score is less than the MDC value, it is considered indistinguishable from measurement error.

Responsiveness Estimates

Sensitivity to change in a pre-post test population (subjects tested both before and after intervention) of subjects diagnosed with TMD has moderate effect size (mean change divided by the standard deviation) of 0.41.⁶ Note that only the original eight-item version has been tested for sensitivity to change.

Reliability Estimates

Internal consistency: determined in a sample of patients (72% female; ages 10–93). Chronbach's alpha (α) for mastication (0.83–0.89), for vertical mobility (0.69–0.97), and for verbal and emotional expression (0.83–0.95).^{6,7}

Interrater: not applicable (questionnaire)

Intrarater: not applicable (questionnaire)

Test-Retest: Subjects with TMD disorders test-retest over 2 weeks Chronbach's rho for eight-item version 0.81; for 20-item version 0.87.⁶

Validity Estimates

Content/Face: Draft self-report instrument was constructed using the initial eight-item JFLS with 44 other items added by a consensus panel of five expert clinicians and researchers in the dental fields of orofacial pain, oral medicine, and prosthodontics. Rasch methodology was used for item reduction and assessment of model fit. Qualitative interviews of patients determined that the final items were understandable, sufficient, and clinically relevant.^{6,7}

Criterion: not available

Construct: The eight-item JFLS was tested to determine whether it measured functional limitation separate from personal disability. As hypothesized, low correlations (0.02–0.26) were found between the JFLS-8 as compared to depression, anxiety, somatization, pain interference, pain-free opening, and palpation sensitivity. Moderate correlations (0.49–0.57) were found with pain and jaw symptoms. Correlations between the eight-item version and 20-item version on all items and individual constructs ranged from 0.80–0.96.⁶

FORM 6-1

JAW FUNCTIONAL LIMITATION SCALE

For each of the items below, please indicate the level of limitation **during the last month**. If the activity has been completely avoided because it is too difficult, circle "10." If you avoid an activity for reasons other than pain or difficulty, leave the item blank.

| | No limitation | | | | | | | | | | Severe limitation |
|---|---------------|---|---|---|---|---|---|---|---|---|-------------------|
| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 1. Chew tough food | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 2. Chew hard bread | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 3. Chew chicken (for example, prepared in oven) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 4. Chew crackers | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5. Chew soft food (for example, macaroni, canned or soft fruits, cooked vegetables, fish) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 6. Eat soft food requiring no chewing (for example, mashed potatoes, apple-sauce, pudding, pureed food) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 7. Open wide enough to bite from a whole apple | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 8. Open wide enough to bite into a sandwich | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 9. Open wide enough to talk | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 10. Open wide enough to drink from a cup | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 11. Swallow | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 12. Yawn | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 13. Talk | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 14. Sing | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 15. Putting on a happy face | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 16. Putting on an angry face | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 17. Frown | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 18. Kiss | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 19. Smile | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 20. Laugh | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

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Selected References

Ohrbach R, Larsson P, List T. The Jaw Functional Limitation Scale: development, reliability, and validity of 8-item and 20-item versions. *J Orofac Pain*. 2008;22(3):219–230.

Ohrbach R, Granger C, List T, Dworkin S. Preliminary development and validation of the Jaw Functional Limitation Scale. *Community Dent Oral Epidemiol*. 2008;36(3):228–236.

SECTION 2: INTERVENTION

INTRODUCTION

Treatment for TMD should begin with conservative management techniques including application of heat or cold, instruction in postural and relaxation exercises, instruction in self-care and activities to avoid, and the use of over-the-counter

pain-reducing medication or other medication as prescribed by the patient's physician.^{15,16} Those who fail to respond to conservative management should be referred for dental and additional specialty evaluation.

BACKGROUND

No studies were found that specifically address intervention for TMJ disorders that occur as a result of mild traumatic brain injury; however, systematic reviews suggest TMD symptoms are best managed using a multimodal approach.^{1,15-17} The majority of

those with TMD respond to symptom management techniques, but for those who experience chronic pain, referral and collaboration with dentists, a multidisciplinary chronic pain center, or both may be needed.

STRENGTH OF RECOMMENDATION: PRACTICE STANDARD

Systematic reviews of the literature indicate that the majority of TMDs can be treated with noninvasive, conservative interventions.^{1,15} In randomized studies that have controlled for severity, patients with mostly physical limitations have shown improvement with patient education on self-care, including use of heat or cold packs, jaw exercises, guidance in activities to avoid (ie, chewing gum, eating hard candy), and progressive muscle relaxation.¹⁷

Intervention Methods

- Provide educational material regarding precautions and activities to avoid for persons with TMD.
- TMD symptoms are best managed using a multimodal approach that includes self-care instruction, stretching exercise, manual therapy, and application of therapeutic modalities.^{15,16}
- Treatment should also include instruction in postural exercises for the neck and upper back.¹⁹
 - Recommended exercises include stretching that is done slowly, gradually, and in a pain-free manner. Recommendations are to have the patient move to the point of mild tension and hold.
 - Exercises recommended by Wright et al¹⁹ include:

- i. chin tucks done hourly;
- ii. chest stretches done in a doorway or corner, several times daily;
- iii. wall stretches with back against wall, elbows and back of hands against wall, stretching arms overhead, several times daily;
- iv. supine chest stretches with hands behind head extending elbows to floor, done each evening; and
- v. prone / face down arm lifts with arms at 90 degrees and arms overhead, done daily.

- The majority of TMDs respond to symptom management techniques, but for those who develop a chronic pain situation, referral to and collaboration with dentists (occlusal splints, evaluation of intracranial sources of pain) or referral to a multidisciplinary chronic pain center (or both) may be needed.

Intervention Resources

- Medline Plus: patient education including an interactive tutorial on TMD disorders, found at: www.nlm.nih.gov/medlineplus/temporomandibularjointdysfunction.html
- National Institute of Dental Craniofacial Research, found at: www.nidcr.nih.gov/OralHealth/Topics/TMJ

JOINT PROTECTION AND SELF-CARE FOR TEMPOROMANDIBULAR DYSFUNCTION

- Relax your jaw muscles. Avoid clenching or grinding your teeth. In your jaw's resting posture, your tongue should rest lightly on the top of your mouth wherever it is most comfortable, while allowing the teeth to come apart and the jaw muscles to relax. Avoid biting on objects like pens or pencils.
- Eat a "pain-free" diet. Avoid chewing gum or eating hard foods, such as bagels, crusty bread, carrot sticks, chewy candy, and tough meat. Eat a softer diet.
- Cut up your food into small pieces. Chew on both sides of your mouth at the same time.
- Avoid resting your jaw on your hand. Do not sleep on your stomach. Sleeping on your side is okay as long as you do not put force on your jaw. Sleeping on your back is best.
- Avoid activities that involve wide opening of the jaw, such as yawning. When you feel like yawning, put your tongue hard against the top of your mouth and let your mouth open as far as it can without letting your tongue off the top of your mouth.
- Avoid or limit caffeine. Caffeine is a "muscle-tensing" drug that can make muscles feel tighter. Caffeine or caffeine-like drugs are in coffee, tea, soda, energy drinks, chocolate, and some aspirins. Decaffeinated coffee typically has half as much caffeine as regular.
- Follow your doctors' suggestions regarding the use of antiinflammatory and pain-reducing medications like ibuprofen, acetaminophen, and aspirin (without caffeine) to reduce joint and muscle pain.
- Use hot packs or ice on the painful area, whatever you find most comfortable.
 - Apply a moist hot pack to the painful area for 15 to 20 minutes, two to four times each day.
 - You can wrap a towel around a gel pack that has been heated according to instructions or a hot water bottle and put it on both sides of your jaw. This should be very warm but comfortable.
 - Try using ice wrapped in a very thin cloth for 5 to 10 minutes, two to four times per day. Keep the ice on the painful area **only** until you first sense some numbness, then remove it.²⁰

REFERENCES

1. Scrivani SJ, Keith DA, Kaban LB. Temporomandibular disorders. *N Eng J Med*. 2008;359(25):2693–2705.
2. Goldberg MB, Mock D, Ichise M, et al. Neuropsychologic deficits and clinical features of posttraumatic temporomandibular disorders. *J Orofac Pain*. 1996;10(2):126–140.
3. Packard RC. Epidemiology and pathogenesis of posttraumatic headache. *J Head Trauma Rehabil*. 1999;14(1):9–21.
4. Pehling J, Schiffman E, Look J, Shaefer J, Lenton P, Friction J. Interexaminer reliability and clinical validity of the Temporomandibular Index: a new outcome measure for temporomandibular disorders. *J Orofac Pain*. 2002;16(4):296–304.
5. Dworkin SF, Turner JA, Mancl L, et al. A randomized clinical trial of a tailored comprehensive care treatment program for temporomandibular disorders. *J Orofac Pain*. 2002;16(4):259–276.
6. Ohrbach R, Larsson P, List T. The Jaw Functional Limitation Scale: Development, reliability, and validity of 8-item and 20-item versions. *J Orofac Pain*. 2008;22(3):219–230.
7. Ohrbach R, Granger C, List T, Dworkin S. Preliminary development and validation of the Jaw Functional Limitation Scale. *Community Dent Oral Epidemiol*. 2008;36(3):228–236.
8. Abernethy B. Dual-task methodology and motor skills research: some applications and methodological constraints. *J Human Movement Studies*. 1988;14:101–132.
9. Cleland JA, Fritz JM, Whitman JM, Palmer JA. The reliability and construct validity of the Neck Disability Index and patient specific functional scale in patients with cervical radiculopathy. *Spine*. 2006;31(5):598–602.

10. Stratford P. Assessing disability and change on individual patients: a report of a patient specific measure. *Physio Canada*. 1995;47:258–263.
11. Westaway MD, Stratford PW, Binkley JM. The patient-specific functional scale: validation of its use in persons with neck dysfunction. *J Orthop Sports Phys Ther*. 1998;27(5):331–338.
12. Pengel LH, Refshauge KM, Maher CG. Responsiveness of pain, disability, and physical impairment outcomes in patients with low back pain. *Spine*. 2004;29(8):879–883.
13. Jensen MP, Karoly P, Braver S. The measurement of clinical pain intensity: a comparison of six methods. *Pain*. 1986;27:117–126.
14. Stratford PW, Spadoni G. The reliability, consistency, and clinical application of a numeric pain rating scale. *Physiother Can*. 2001;53(2):88.
15. McNeely ML, Armijo Olivo S, Magee DJ. A systematic review of the effectiveness of physical therapy interventions for temporomandibular disorders. *Phys Ther*. 2006;86(5):710–725.
16. Medlicott MS, Harris SR. A systematic review of the effectiveness of exercise, manual therapy, electrotherapy, relaxation training, and biofeedback in the management of temporomandibular disorder. *Phys Ther*. 2006;86(7):955–973.
17. Truelove E, Huggins KH, Mancl L, Dworkin SF. The efficacy of traditional, low-cost and nonsplint therapies for temporomandibular disorder: a randomized controlled trial. *J Am Dent Assoc*. 2006;137(8):1099–1107; quiz 1169.
18. Higbie EJ, Seidel-Cobb D, Taylor LF, Cummings GS. Effect of head position on vertical mandibular opening. *J Orthop Sports Phys Ther*. Feb 1999;29(2):127–130.
19. Wright EF, Domenech MA, Fischer JR, Jr. Usefulness of posture training for patients with temporomandibular disorders. *J Am Dent Assoc*. 2000;131(2):202–210.
20. Wright EF, Schiffman EL. Treatment alternatives for patients with masticatory myofascial pain. *J Am Dent Assoc*. 1995;126:1030–1039.

