Case Report

Automobilization intervention and exercise for temporomandibular joint open lock

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Temporomandibular joint disorders (TMDs) are common and may cause temporomandibular joint (TMJ) locking, pain, and disability. Evidence supports use of manual therapy and exercise for treatment of TMDs including disk displacement limiting full mouth opening, TMJ 'closed lock'. Only limited case studies describe management of TMJ 'open lock', a condition due to posterior disk displacement (PDD) or TMJ anterior dislocation (TMJ-AD). Reported treatment for open lock includes splinting and intraoral joint manipulation. This case report describes a novel extraoral automobilization using the mandibular elevator muscles to treat TMJ open lock in a 22-year-old male after intraoral joint mobilization failed. The exercise program used to restore neuromuscular control for post-reduction management is described. Short term results of automobilization were excellent with restored ability to swallow, speak normally, and achieve occlusion. Long term results at 14 months were good: the patient was pain-free, could swallow and speak normally, had no recurrence of TMJ locking, and minimal disability. Limited right lateral excursion range and left mandibular deviation during mouth opening indicated possible persistence of PDD. This case suggests that mandibular elevator automobilization and masticatory muscle exercise may be useful to treat TMJ open lock and should be considered to treat PDD and TMJ-AD.

Keywords: Temporomandibular joint, Dislocation, Open lock, Posterior disk displacement, Joint mobilization, Manipulation, Temporomandibular disorder, Physical therapy, TMD

Background

Temporomandibular joint (TMJ) disorders are common. Lifetime prevalence of temporomandibular joint disorder (TMD) signs and symptoms is reported to be 6–93%.¹ More conservative estimates report TMD prevalence to be 10–34% with women affected more frequently than men.^{2–5} TMD may affect children and adults; however, mean age is reported to be 30–40 years.² An international consortium described three categories of TMD: Group I, myofascial disorders; Group II, disk displacement with or without reduction; and Group III, arthralgia, arthrosis, and arthritis (Research Diagnostic Criteria for Temporomandibular Disorders).^{6,7} A recent systematic review reported prevalence rates for TMD categories: Group I, 45.3%; Group II, 41.1%; and Group III, 30.1%.² The Research Diagnostic Criteria for Temporomandibular Disorders classification does not include TMJ dislocation; however, Stegenga⁸ groups TMJ dislocation with disk displacement as mechanical derangements. Both disk displacement and TMJ dislocation may cause joint locking, pain and limited TMJ motion.⁹ Since TMD is painful, may cause joint locking, and frequently

limits performance of daily activities, e.g., eating and speaking,¹⁰ effective interventions are needed.

Temporomandibular joint locking may prevent full mouth opening or occlusion, due to disk displacement or condylar dislocation.^{1,8,9} Disk displacement occurs when the disk is displaced relative to the mandibular condyle. Anterior disk displacement (ADD) is most common.^{11–13} ADD may limit full mouth opening, a 'closed lock'^{12,14,15} of the mouth. However, all or most of the disk may displace posteriorly, causing the mouth to be locked open, a rare condition called 'open lock'.^{9,16–18} One retrospective study reported posterior disk displacement (PDD) visible on MRI in 62 of approximately 4000 TMJs with internal derangement.¹⁸ PDD may have three disk morphologies: a thin disk extending posterior to the condyle, a centrally perforated disk with a large posterior portion, and a disk entirely posterior to the condyle¹⁷ (Fig. 1). Chossegros *et al.*¹⁹ hypothesize that PDD may be reducible and non-reducible, similar to ADD.¹³ Clinical symptoms of PDD include pain, clicking, crepitation, open lock, and dislocation.¹⁸ Kai *et al.*⁹ propose that TMJ anterior dislocation (TMJ-AD) and open lock/PDD are similar and may be described as dislocation without and with self-reduction (TMJ-ADSR), respectively. In TMJ-AD the condyle is anterosuperior to the temporal articular

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Figure 1 Posterior disk displacement: disk morphology types. (A) long, thin disk that extends posterior to the condyle; (B) centrally perforated disk with a large posterior portion; (C) disk positioned entirely posterior to the condyle. Reprinted from *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology*, vol. 105, Okochi K, Ida M, Honda E, Kobayashi K, Kurabayashi T, MRI and clinical findings of posterior disk displacement in the temporomandibular joint, p. 644–8, 2008,¹⁸ with permission of Elsevier.

eminence and is unable to translate into the mandibular fossa.^{9,16} In TMJ-ADSR, open lock, and PDD the condyle is anterosuperior or inferior to the articular eminence.^{9,16} A common mechanism for PDD, TMJ-AD and TMJ-ADSR is attempted mouth closing following maximal mouth opening, e.g., during yawning.^{16,19–22} The proposed etiology for open lock is disruption of neuromuscular control so that contraction of the masseter, temporalis, and medial pterygoid muscles causes condylar elevation while either the disk remains in a posterior position, or the lateral pterygoid muscles remain active maintaining the condyle in protrusion.^{9,20–22} There is currently no consensus on optimal treatment of open lock, whether the cause is PDD without reduction (PDDWR) or TMJ-AD.¹⁸

Recent systematic reviews of TMD management do not report interventions for open lock, PDD, TMJ-AD, or TMJ-ADSR.^{3,23,24} Additionally, there are very limited reports of diagnosis and management of PDD or open lock. Westesson *et al.*¹⁷ described MRI findings in 35 TMJs with PDD versus bilateral TMJs in 62 healthy persons and reported the three previously described disk morphologies (Fig. 1). Okochi *et al.*¹⁸ explored the prevalence of PDD subcategories on MRI and clinical findings in 62 TMJs with PDD. Both groups of researchers reported the thin disk type to be most common (81–84%), the perforated disk type less common (10–16%), and the completely posterior disk least common (0–10%).^{17,18} Neither group of researchers discussed PDD management. A few case reports and small case series reported PDDWR management using intraoral joint manipulation ($\pm$ general or local anesthesia) and intraoral occlusal splinting ($\pm$ canine elastic traction).^{19,25–28} Management of TMJ-AD, another cause of open lock, was reported in a retrospective review²⁰ and a recent systematic review²² of TMJ

dislocation. Management of acute TMJ-AD was reported to be manual reduction ($\pm$ anesthesia), reduction utilizing the gag reflex, and surgery.^{20,22} Traditional TMJ-AD manual reduction is an infero-posterior force applied to the condyle via the mandibular molars.^{29–31} This intraoral approach has disadvantages including potential bite wound for the practitioner, difficulty overcoming strong masticatory muscle contractions, and inability of the patient to tolerate the procedure due to pain without local or general anesthesia.^{29,30,32,33} Reports of post-reduction treatment of TMJ-AD are minimal and limited to two case series which utilized intraoral occlusal splinting.^{9,16} Although exercise has been reported as beneficial for persons with non-specific TMD or TMD with ADD,^{3,13,23,24,34} no reports were found describing exercise following joint reduction for TMJ-AD, PDD, or open lock.

The purpose of this case report is to describe a novel joint mobilization technique using the patient's muscular force that was effective in reduction of open lock of the TMJs due to an apparent PDDWR or TMJ-AD. This report describes the clinical decision making for utilization of this automobilization to reduce open lock when an intraoral joint mobilization was ineffective. In addition, a home exercise program for post-reduction management is described.

Patient Characteristics

The patient was a 22-year-old male physical therapy student who consulted with the first author due to acute inability to achieve occlusion following extreme mouth opening while eating. The patient's medical history was unremarkable and he took no medication. His dental history was unremarkable with no history of orthodontia, tooth extraction or corrective surgeries. He reported a history of opening and closing clicks of bilateral TMJs with maximal mouth opening during eating and yawning. Additionally, he reported a similar episode of mouth locking a few days earlier. At that time he was able to achieve mouth closure by self-intraoral inferior gliding on the right mandibular molars.

Examination

Initial history taking was limited due to the patient's difficulty with speech, although midrange mandibular movement was possible. He complained of pain around the right TMJ and an inability to close his mouth. This interfered with chewing, swallowing, and speaking. He denied any paresthesias or external facial trauma. He reported that a physical therapist attempted intraoral joint mobilization to reduce the locked position. The unsuccessful mobilization was described as a mandibular infero-posterior glide via bilateral mandibular molars while he was supine. His mouth had been locked open approximately 2 hours. His goal was to be able to close his mouth.

The patient was a young adult male in no acute distress; however, his mouth was locked open and in mandibular protrusion. No right or left mandibular deviation, facial asymmetry, swelling or abnormal tone of the facial muscles were noted. He had difficulty articulating words, but was able to move in midrange mouth opening and closing to speak. A focused examination was performed to avoid possible increased pain and determine the irritability of the patient's condition. Assessment of mouth opening was performed by the finger width test,³⁵ the number of the patient's own flexed proximal interphalangeal (PIP) joints able to be placed between his incisors. Mouth opening was to a 3-knuckle width, which Dutton³⁵ reports is normal-excessive. Finger width test³⁵ reliability is unknown; however, more specific measurement of mouth opening (1) was deemed unnecessary since the problem was limited occlusion and (2) may have increased pain as maximal opening was the mechanism of injury. The patient was unable to close his mouth to achieve the median occlusal position. No lateral deviation was noted during midrange mouth opening or closing. Palpation revealed depressions anterior to the lobules of the ears and tenderness to palpation of the masseters and the lateral TMJs.^{21,36} Interrater reliability of masticatory muscle and joint palpation for reproduction of pain is reported to be moderate ($k=0.51$) and fair ($k=0.33$), respectively.³⁷ Pain produced by lateral TMJ palpation was reported to be predictive of TMJ joint effusion (accuracy=76.2%, $k=0.525$).³⁸ Resisted testing of mandibular elevation was performed by the patient biting on the flexed PIPs of his index and long fingers, which did not increase pain. Following the resisted test he was observed to have slightly increased mouth closure.

Clinical Impression

The mechanism of injury of attempted mouth closure following extreme opening, normal-excessive mouth opening range, limited occlusion, symmetrical mandibular motion during opening and closing, and mouth acutely locked open indicated the condition was an open lock of bilateral TMJs. The hypothesized etiology was PDDWR or TMJ-AD. Palpable depressions anterior to the ear lobules and TMJ tenderness made this hypothesis more likely.^{21,31} Although the masseters were tender to palpation, this did not rule out a mechanical derangement. Kai *et al.*⁹ reported masseter tenderness in TMJ-AD and hypothesized it was due to muscle spasm secondary to pain.^{9,22,30} No increase in pain with masseter contraction in a midrange position ruled out myofascial pain as the primary source of symptoms.³⁹ Recommended treatment for TMJ-AD is manual reduction²² and joint infero-posterior mobilization was reported effective for PDDWR management in one case study.²⁷ This

Figure 2 Automobilization with 6 cm-thick compressible wedge.

patient had not responded to an intraoral mobilization, however, possibly due to muscle spasm and pain. Since he was able to tolerate partial range active and resistive mouth closure, and as increased occlusion was achieved following resisted mandibular elevation, it was thought he may tolerate a joint mobilization utilizing contraction of the temporalis and masseter muscles, an automobilization. If automobilization was not tolerated, it was thought referral to an emergency department would be indicated.

Intervention

The automobilization was performed by the patient's performance of an approximately 3-seconds-long incisal bite on an improvised compressible wedge placed between his incisors. The wedge, approximately 3 cm thick, was created from a rolled washcloth covered with a latex-free examining glove (Fig. 2). Biting the wedge increased his pain slightly; however, it did not remain increased. The wedge compressed to approximately 5–10 mm in thickness during the automobilization, causing the patient's mouth to be near occlusion. It was thought the procedure would be better tolerated and more effective at condylar posterior translation in midrange mouth opening, that is, in the TMJ open-packed position.⁴⁰ Automobilization was performed again with a 6 cm thick wedge; this wedge compressed to approximately 1–2 cm. He reported no increased pain and slightly improved occlusion. Automobilization was repeated approximately 5 times. Following this, he was able to achieve occlusion, swallow, and speak normally.

Open lock may recur spontaneously.⁹ Since the patient's jaw had been locked open twice within the previous few days, recurrence was considered likely. Therefore, the patient was instructed to use the wedge or his flexed PIPs to perform automobilization as needed. He was instructed to avoid maximal mouth opening for 2–3 weeks and to follow up with the first

Table 1 Rocabado⁴¹ 6 × 6 exercise protocol. Exercises performed 6 times each, 6 sessions per day

Exercise name	Exercise description
Rest position of the tongue	Tip of tongue on anterior palate, just posterior to upper front teeth ('rest position'), perform 'clucking' sound; practice diaphragmatic breathing through the nose during exercise (avoid use of accessory respiratory muscles).
Control TMJ rotation	Controlled opening of mouth in a 'hinge' fashion. Tongue in rest position, open mouth maintaining tongue on anterior palate to avoid anterior condylar translation.
Rhythmic stabilization	Tongue in rest position, resist right and left lateral deviation of the jaw, resist jaw opening and closing (resistance at chin with index fingers).
Cervical joint liberation	Upright posture, laced hands behind cervical spine for stabilization of C2–C7, perform head nodding motion (craniocervical flexion).
Axial cervical extension	Upright posture, perform cervical retraction exercise moving the head back while maintaining ears and eyes level (upper cervical flexion and lower cervical extension).
Shoulder girdle retraction	Upright posture, retract and depress shoulder girdles while maintaining proper cervical spine posture.

Note: TMJ=temporomandibular joint; C2=2nd cervical vertebra; C7=7th cervical vertebra.

physical therapist for instruction in therapeutic exercises to restore neuromuscular control of the mandibular muscles and to target any additional impairments.

The patient was instructed in Rocabado's '6 × 6 exercise protocol'.⁴¹ This protocol is designed to restore neuromuscular control, improve TMJ mobility, and improve cervical spine and upper back postural impairments thought to increase TMJ stress. It includes 6 exercises that are to be performed 6 times each at a frequency of 6 sessions per day (Table 1). The patient was instructed to perform these exercises for 6 weeks.

Outcomes

The short term response to automobilization was excellent as the patient was able to achieve occlusion and speak and swallow normally. He was contacted 14 months following treatment to determine the long term response (Table 2). He reported continuing the home program for 6 weeks, however, only 3 sessions per day. He had also modified his behavior to avoid extreme mouth opening. He was pain-free, had no recurrence of TMJ locking and had not required use of the TMJ automobilization. The Steigerwald/Maher

TMD Disability Questionnaire, as modified by Cleland and Palmer,¹³ was used to assess function and symptoms.⁴² This questionnaire has three components: the TMD Disability Index, the TMD Symptom Intensity Scale, and the TMD Symptom Frequency Scale (Appendix). The TMD Disability Index includes 10 questions with 5 responses each (possible scores: 0–40, higher scores indicate greater disability). The TMD Symptom Intensity and TMD Symptom Frequency Scales each include seven items, scored from 0 to 10 (possible scores: 0–70, higher scores indicate greater symptom intensity and frequency). Psychometric properties have not been reported for this questionnaire. Signs and symptoms of persistent TMDs were observed including limited right lateral excursion range with a reported sensation of an obstruction to motion and a 'C' curve with left mandibular deviation during mouth opening and closing (Table 2).

Discussion

This case report has shown how a novel automobilization technique combined with a neuromuscular reeducation program was used to manage TMJ open

Table 2 Patient outcomes

Outcome measure	Initial presentation	Immediately following automobilization	14 month follow-up
Ability to chew, swallow, and speak	Significant difficulty	Able to swallow and speak without difficulty	Able without difficulty
Pain	+ at right TMJ area	Unknown	None
TMD Disability Index ⁴² (0–40); (percentage)	N/A	N/A	1; (2.5%)
TMD Symptom Intensity Scale ⁴² (0–70)	N/A	N/A	0
TMD Symptom Frequency Scale ⁴² (0–70)	N/A	N/A	0
Tenderness to palpation	+ bilateral masseters and bilateral TMJ	N/A	No tenderness to palpation
Maximum intercuspation	Unable	Able	Able
Mouth opening	3 knuckle width	N/A	3 knuckle width; 46 mm (apprehension)
Overjet	N/A	N/A	2 mm
Overbite	N/A	N/A	1 mm
Lateral excursion (endfeel)	N/A	N/A	Left: 7 mm (capsular); Right: 0 mm (firm, pain at right TMJ)
Protrusion (endfeel)	N/A	N/A	9 mm (capsular)
Retrusion (endfeel)	N/A	N/A	3 mm (firm, pain at right TMJ)
Opening and closing pattern	No deviation (midrange)	N/A	C curve, deviation to Left

Note: + = positive; TMJ=temporomandibular joint; TMD=temporomandibular disorder; N/A=not applicable; %=percent.

lock in a 22-year-old male. Automobilization was successful at reducing the internal derangement when intraoral mobilization failed, resulting in immediate restoration of the ability to achieve occlusion, swallow, and speak normally. The patient's performance of the '6 × 6 exercise protocol' may have been useful to improve mandibular neuromuscular control during activities involving extreme mouth opening. Improved motor control, with the patient's self-limitation in mouth opening, may have prevented a subsequent episode of open lock. Long term results of this multimodal program may be beneficial as evidenced by restoration of normal mouth activities, abolishment of pain, and lack of recurrence. The limited right lateral excursion, associated sensation of right TMJ obstruction, firm endfeel and right TMJ pain during passive overpressure indicates the patient may have persistence of PDD of the right TMJ.^{19,35,41} The 'C' curve during opening and closing may be due to early translation of the right TMJ due to a PDD or to early contraction of the right lateral pterygoid muscle.³⁵ The patient may have benefited from a course of supervised physical therapy with manual therapy and exercise to address these impairments.

This case suggests that TMJ automobilization utilizing mandibular elevator muscle contraction may be a useful technique to reduce TMJ open lock. Clinicians should consider using mandibular elevator automobilization for patients with PDDWR and TMJ-AD, either as the first intervention or if intraoral infero-posterior joint mobilization is ineffective. Additionally, an exercise program focusing on restoration of mandibular neuromuscular control may be an important intervention to prevent recurrence of open lock. Although a cause and effect relationship cannot be determined from a case report, this is the first to demonstrate the potential benefit from an extraoral joint mobilization as a method to reduce TMJ open lock, and minimize exposure of the clinician to injury or disease. This is also the first report of an exercise program for post-reduction management of TMJ open lock due to possible PDDWR or TMJ-AD.

Manual therapy is frequently used in management of TMDs in general and in disk displacement and TMJ-AD in particular.^{3,22–24} In PDDWR and TMJ-AD, mandibular condyle posterior translation is blocked by the disk or articular eminence.^{9,16–18,22} The individual requires assistance to achieve occlusion.^{17,22,31} However, it may be impossible to manually overcome the strong force exerted by temporalis and masseter muscle spasm.^{22,31,43} It is possible that automobilization using contraction of these muscles performed with the mouth partially open placed the muscles at a more optimal length to promote condylar posterior translation.⁴⁴ Effectiveness of the automobilization with the 6-cm thick wedge may have been due to an optimal

length–tension relationship of the mandibular elevators, resulting in greater posterior translation force from the deep portion of the masseter and the horizontal fibers of the temporalis.⁴⁵ The 6 cm-thick wedge and partially opened mouth may have changed the angle of application of these muscles, resulting in increased posterior translation force.⁴³ The thicker wedge, that compressed to approximately 1–2 cm thickness, may have been effective as it placed the TMJs in the open-packed position. The first attempt may have been unsuccessful as the thinner wedge caused the mouth to be near full closure, the TMJ close-packed position.⁴³ Additionally, mandibular elevator automobilization may be more effective with an incisal rather than molar bite as TMJ joint reaction force is less in the former, allowing easier condylar translation.⁴⁴

Reciprocal inhibition of the lateral pterygoid muscles during resisted mandibular elevation may have caused the automobilization's effect. This muscle causes anterior condylar translation during mouth opening and has been associated with TMJ anterior subluxation and dislocation.^{31,44} Lateral pterygoid inhibition during mandibular elevator contraction may have allowed posterior mandibular translation and occlusion to occur.⁴⁶ The performance of the 6 × 6 home exercises may have been instrumental in prevention of recurrence of this patient's open lock. Furto *et al.*³⁴ reported improvement in Steigerwald/Maher TMD Disability Index scores from a 2-week course of physical therapy including neuromuscular reeducation exercises and manual therapy in persons with TMDs. Lowery *et al.*²¹ report mandibular anterior dislocation is due to disturbance of the normal muscular sequence during biting. Participation in the exercises may have restored the patient's normal mandibular neuromuscular control sufficiently to prevent open lock recurrence. Persistence of aberrant movement during mouth opening and closing, however, indicates the patient may experience a future episode of open lock due to muscle timing problems.

Limitations of this case report include the lack of Steigerwald/Maher TMD Disability Questionnaire data for the initial visit. Due to the acute and irritable nature of this condition,⁴⁷ instrumented measurement of mouth opening and lateral excursion was not performed at the initial visit. Additionally, as other factors may have contributed to the outcome, caution should be exercised when applying this intervention to other individuals.

Although this case report cannot demonstrate a cause-and-effect relationship, joint manipulation and exercise for TMD management is reported to be beneficial.^{3,23,24} Manual reduction of TMJ-AD is considered the standard of care³⁰ and joint manipulation to treat PDDWR has been reported.²⁷ This is the first case to report use of a mandibular elevator

automobilization and exercise in management of TMJ open lock due to a suspected PDDWR or TMJ-AD. This multimodal approach may have been effective in restoration of normal mouth function and a pain-free status. Studies are needed to determine if this automobilization is more effective and better

tolerated than previously reported intraoral or extraoral manual reduction techniques. Future studies should also examine the effectiveness of a formal supervised exercise program for open lock, addition of manual therapy, and the mechanism for the automobilization.

Appendix

Reproduced from Cleland J, Palmer J with permission of *The Journal of Orthopaedic and Sports Physical Therapy* and the Orthopaedic and Sports Physical Therapy Sections of the American Physical Therapy Association. Effectiveness of manual physical therapy, therapeutic exercise, and patient education on bilateral disc displacement without reduction: a single-case design. *J Orthop Sports Phys Ther* 2004;34(9):535–48.¹³ Permission also granted by *Today's Chiropractic Lifestyle* (originally *Today's Chiropractic*), the publisher of the original manuscript. Steigerwald DP, Maher JH. The Steigerwald/Maher TMD disability questionnaire. *Today's Chiropractic* 1997;July–August:86–91.⁴²

TMD Disability Index

Name _____ M/F _____ Age _____ Date _____ Score _____

Please check the statement that best pertains to you (not necessarily exactly) in each of the following categories.

1. Communication (talking).

- ☐ I can talk as much as I want without pain, fatigue or discomfort.
- ☐ I can talk as much as I want but it causes some pain, fatigue and/or discomfort.
- ☐ I can't talk as much as I want because of pain, fatigue and/or discomfort.
- ☐ I can't talk much at all because of pain, fatigue and/or discomfort.
- ☐ Pain prevents me from talking at all.

2. Normal living activities (brushing teeth/flossing).

- ☐ I am able to care for my gums and teeth in a normal fashion without restriction, and without pain, fatigue or discomfort.
- ☐ I am able to care for all my teeth and gums, but I must be slow and careful, otherwise pain/discomfort, jaw tiredness results.
- ☐ I do manage to care for my teeth and gums in a normal fashion, but it usually causes some pain/discomfort, jaw tiredness no matter how careful I am.
- ☐ I am unable to properly clean all my teeth and gums because of restricted opening and/or pain.
- ☐ I am unable to care for most of my teeth and gums because of restricted opening and/or pain.

3. Normal living activities (eating, chewing).

- ☐ I can eat and chew as much of anything I want without pain/discomfort or jaw tiredness.
- ☐ I can eat and chew most anything I want, but it sometimes causes pain/discomfort and/or jaw tiredness.
- ☐ I can't eat much of anything I want, because it often causes pain/discomfort, jaw tiredness or because of restricted opening.
- ☐ I must eat only soft foods (consistency of scrambled eggs or less) because of pain/discomfort, jaw fatigue and/or restricted opening.
- ☐ I must stay on a liquid diet because of pain and/or restricted opening.

4. Social/recreational activities (singing, playing musical instruments, cheering, laughing, social activities, playing amateur sports/hobbies, and recreation, etc).

- ☐ I am enjoying a normal social life and/or recreational activities without restriction.
- ☐ I participate in normal social life and/or recreational activities but pain/discomfort is increased.
- ☐ The presence of pain and/or fear of likely aggravation only limits the more energetic components of my social life (sports, exercise, dancing, playing musical instruments, singing).
- ☐ I have restrictions socially as I can't even sing, shout, cheer, play, and/or laugh expressively because of increased pain/discomfort.
- ☐ I have practically no social life because of pain.

5. Non-specialized jaw activities (yawning, mouth opening and opening my mouth wide).

- ☐ I can yawn in a normal fashion, painlessly.
- ☐ I can yawn and open my mouth fully wide open, but sometimes there is discomfort.
- ☐ I can yawn and open my mouth wide in a normal fashion, but it almost always causes discomfort.
- ☐ Yawning and opening my mouth wide are somewhat restricted by pain.
- ☐ I cannot yawn or open my mouth more than two finger widths (2.8-3.2 cm) or, if I can, it always causes greater than moderate pain.

6. Sexual function (including kissing, hugging and any and all sexual activities to which you are accustomed).

- ☐ I am able to engage in all my customary sexual activities and expressions without limitation and/or causing headache, face or jaw pain.
- ☐ I am able to engage in all my customary sexual activities and expressions, but it sometimes causes some headache, face, or jaw pain, or jaw fatigue.
- ☐ I am able to engage in all my customary sexual activities and expressions, but it usually causes enough headache, face or jaw pain to markedly interfere with my enjoyment willingness and satisfaction.
- ☐ I must limit my customary sexual activities and expressions because of headache, face or jaw pain or limited mouth opening.
- ☐ I abstain from almost all sexual activities and expression because of the head, face or jaw pain it causes.

7. Sleep (restful, nocturnal sleep pattern).

- ☐ I sleep well in a normal fashion without any pain medication, relaxants or sleeping pills.
- ☐ I sleep well with the use of pain pills, anti-inflammatory medication or medicinal sleeping aids.
- ☐ I fail to realize 6 hours of restful sleep even with the use of pills.
- ☐ I fail to realize 4 hours of restful sleep even with the use of pills.
- ☐ I fail to realize 2 hours of restful sleep even with the use of pills.

8. Effects of any form of treatment, including, but not limited to, medications, in-office therapy, treatments, oral orthotics (e.g., splints, mouthpieces), ice/heat, etc.

- ☐ I do not need to use treatment of any type in order to control or tolerate headache, face or jaw pain and discomfort.
- ☐ I can completely control my pain with some form of treatment.
- ☐ I get partial, but significant, relief through some form of treatment.
- ☐ I don't get "a lot" of relief from any form of treatment.
- ☐ There is no form of treatment that helps enough to make me want to continue.

9. Tinnitus, or ringing in the ear(s).

- ☐ I do not experience ringing in my ear(s).
- ☐ I experience ringing in my ear(s) somewhat, but it does not interfere with my sleep and/or my ability to perform my daily activities.
- ☐ I experience ringing in my ear(s) and it interferes with my sleep and/or daily activities, but I can accomplish set goals and can get an acceptable amount of sleep.
- ☐ I experience ringing in my ear(s) and it causes a marked impairment in the performance of my daily activities and/or results in an unacceptable loss of sleep.
- ☐ I experience ringing in my ear(s) and it is incapacitating and/or forces me to use a masking device to get any sleep.

10. Dizziness (lightheaded, spinning and/or balance disturbance)

- ☐ I do not experience dizziness.
- ☐ I experience dizziness, but it does not interfere with my daily activities.
- ☐ I experience dizziness, which interferes somewhat with my daily activities, but I can accomplish my set goals.
- ☐ I experience dizziness, which causes a marked impairment in the performance of my daily activities.
- ☐ I experience dizziness, which is incapacitating.

Scoring Method For the TMD Disability Index

Example:

10. Dizziness (lightheaded, spinning and/or balance disturbance)

- ☐ 0 (a) I do not experience dizziness.
- ☐ 1 (b) I experience dizziness, but it does not interfere with my daily activities.
- ☐ 2 (c) I experience dizziness, which interferes somewhat with my daily activities, but I can accomplish my set goals.
- ☐ 3 (d) I experience dizziness, which causes a marked impairment in the performance of my daily activities.
- ☐ 4 (e) I experience dizziness, which is incapacitating.

If the patient chooses "d" a score of 3 is calculated for this first of 10 questions. The total points from the ten questions are added together and is divided by the total number possible. Maximum possible score is 40.

TMD Symptom Intensity Scale (SIS) and Symptom Frequency Scale (SFS)

TMD Symptom Intensity Scale (SIS)

Name _____ Date _____ Date of birth _____ Age _____

Please indicate the intensity of your symptoms as follows:

- Circle the number on the scale to indicate your most usual symptom level.
- Draw an X through the number to indicate your most severe symptom level.

1. Jaw pain	No pain	0 1 2 3 4 5 6 7 8 9 10	Most intense pain
2. Painful jaw clicking	No pain	0 1 2 3 4 5 6 7 8 9 10	Most intense pain
3. Jaw locking	No pain to open mouth	0 1 2 3 4 5 6 7 8 9 10	Can barely open mouth
4. Headaches	No pain	0 1 2 3 4 5 6 7 8 9 10	Most intense pain
5. Neck pain and/or upper shoulder muscle pain	No pain	0 1 2 3 4 5 6 7 8 9 10	Most intense pain
6. Dizziness	No dizziness	0 1 2 3 4 5 6 7 8 9 10	Most intense dizziness
7. Ringing in the ears	No ringing	0 1 2 3 4 5 6 7 8 9 10	Most intense ringing

TMD Symptom Frequency Scale (SFS)

Please indicate the frequency of your problems as follows:

- Circle the number on the scale to indicate how often you experience the following symptoms.

1. Jaw pain	Never	0 1 2 3 4 5 6 7 8 9 10	100% of the time
2. Painful jaw clicking	Never	0 1 2 3 4 5 6 7 8 9 10	100% of the time
3. Jaw locking	Never	0 1 2 3 4 5 6 7 8 9 10	100% of the time
4. Headaches	Never	0 1 2 3 4 5 6 7 8 9 10	100% of the time
5. Neck pain and/or upper shoulder muscle pain	Never	0 1 2 3 4 5 6 7 8 9 10	100% of the time
6. Dizziness	Never	0 1 2 3 4 5 6 7 8 9 10	100% of the time
7. Ringing in the ears	Never	0 1 2 3 4 5 6 7 8 9 10	100% of the time

Scoring for TMD Symptom Intensity and Frequency Scales

1. Jaw pain	No pain	0 1 2 3 4 5 6 7 8 9 10	Most intense pain
2. Painful jaw clicking	No pain	0 1 2 3 4 5 6 7 8 9 10	Most intense pain
3. Jaw locking	No pain to open mouth	0 1 2 3 4 5 6 7 8 9 10	Can barely open mouth
4. Headaches	No pain	0 1 2 3 4 5 6 7 8 9 10	Most intense pain
5. Neck pain and/or upper shoulder muscle pain	No pain	0 1 2 3 4 5 6 7 8 9 10	Most intense pain
6. Dizziness	No dizziness	0 1 2 3 4 5 6 7 8 9 10	Most intense dizziness
7. Ringing in the ears	No ringing	0 1 2 3 4 5 6 7 8 9 10	Most intense ringing

- Maximum score = 70
- Calculating patient score: Total score/maximum score possible x 100 = Final score

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