A MOVEMENT SYSTEM IMPAIRMENT TREATMENT OF TMD

Debra F. Fink DMD, MS, private practice, St. Louis, MO

Mary Kate McDonnell, PT, DPT, OCS, Assistant Professor, Washington University School of Medicine, Program in Physical Therapy, St. Louis, MO

Michelle Kinney, DPT, private practice, St. Louis, MO

Shirley Sahrmann PT, PhD, FAPTA, Professor, Washington University School of Medicine, Program in Physical Therapy, St. Louis, MO

Linda Van Dillen, PT, PhD, Associate Professor, Washington University School of Medicine, Program in Physical Therapy, St. Louis, MO

Excerpts from a presentation given by Dr. Debra F. Fink at the 34th International Annual Conference on Craniofacial Research at The Michigan League on the campus of the University of Michigan, Ann Arbor, Michigan on February 29, 2008.

I. A MOVEMENT SYSTEM IMPAIRMENT TREATMENT OF TMD

We propose that forward head position and/or cervical extension is the result of a movement impairment syndrome whose origins can begin numerous places in the trunk of the body and that once the forward head position and its origin are corrected through exercises, TMD is eliminated or reduced. This is a matter of ongoing research. The Movement System Impairment (MSI) approach (Sahrmann, 2002) in the diagnosis of pain, rather than focus on a disc or a muscle or even one joint, takes a complete view of the individual’s body and its daily routine. The first cause of pain may be far from the pathoanatomic source of the pain. The goal is to eliminate pain by following the trail to the first cause of the pain that is associated with movement.

The primary causes of mechanical pain are movements that deviate from the normal kinesiological standard (Sahrmann, 2002, p.10). Pain is associated with loss of precise movement, because non-ideal movement mechanically irritates the tissues leading to microtrauma and eventually to macrotrauma (Sahrmann, 2002, p.13). The MSI diagnosis focuses on the movement impairment that produces pain, because correction of the movement impairment will redistribute forces and allow the affected tissues to heal, alleviating the pain associated with movement.

Movement impairments occur over time. These faulty movement patterns are most often associated with daily work habits, recreational activities or exercise. The impairment can be caused by repeated movements, e.g., an avid golfer’s swing or by sustained postures, e.g., slouching when sitting in a chair. The human body is marvelously adaptive to such repeated or sustained incorrect postures. Movement impairments will affect the length, strength and stiffness of muscles, which in turn affects the movement patterns of the joint, neighboring muscles and interacting joints (McDonnell, 2002).

This MSI approach seeks to first correct the movement causing the pain by teaching proper posture, proper movement patterns and corrective exercises. Only then are the appropriate muscles strengthened with exercise. Modalities, such as ultrasound, spray and stretch, electrogalvanic stimulation, acupuncture, trigger point injections, TENS and cold laser are not used (Sahrmann, 2002, p.45). These modalities merely disguise the pain and it is the pain that provides a diagnostic indicator of the incorrect movement for both the physical therapist and the patient. Orthodontic treatment, dental restorative treatment or the use of splints
does not interfere with the MSI approach. The goal is to establish correct movement which is pain free and which the patient can maintain without reliance on the health care system.

There is an array of benefits to the patient that have been demonstrated by the MSI approach:

- eliminate or reduce pain within the first month,
- restore function, that is, ability for increased mouth opening and chewing,
- non-invasive,
- cost effective, that is, patient is responsible for co-pay only,
- empower patient with personal management skills that make them independent of the health care system,
- the MSI physical therapist routinely trains the patient to posture and move their backs, shoulders, arms, neck and TMJ more optimally.

The Movement System Impairment (MSI) approach in treating TMD is an extension of Dr. Shirley Sahrmann’s movement impairment system of diagnosis, classification and treatment of backs, hips, legs, arms, shoulders and necks that she developed at Washington University School of Medicine. The MSI approach to treatment views the movement mechanics of the human body in its entirety, taking into account neurological, medical, and psychological as well as biomechanical factors that contribute to dysfunction and pain.

In the literature there is evidence of successful outcomes from therapeutic exercises and posture training in the treatment of TMD. Research has shown the efficacy of therapeutic exercise and postural training in treating TMD of muscle origin (Komiyama, 1999), disc displacement without reduction (Yoda, 2003), disc displacement with reduction (Yuasa, 2001) and TMD due to inflammatory responses (Tegelberg, 1988).

There is not yet proof for the hypothesis that there is a causal relationship between forward head position and TMD (Kraus, 2007 and Olivo et al., 2006). Yet there is evidence that 71% of patients with TMD also have neck, back and/or shoulder pain (Turp et. al., 1997) and that a co-morbidity exists between long term back pain and TMD (Weisinger et. al., 2007). In this pilot study, forward head position can be a predisposing factor for TMD. Forward head position is typically a product of a muscle impairment syndrome, but the cause of the impairment may be located away from the neck and TMJ. The length and strength of the cervical spine muscles responsible for forward head position are influenced by the alignment of the tho-
racic spine, which is influenced by the alignment of the lumbar spine. For example, it is the lumbar spine and associated muscles that are first affected by slouching in a chair. That incorrect posture affects the thoracic and cervical spine and associated muscles, leading to a forward head position. The MSI trained physical therapist analyzes the entire spine, shoulder girdle, neck and lastly the TMJ. This method identifies and eliminates the underlying mechanical problems that influence, directly or indirectly, the muscles associated with movement of the temporomandibular joint. Correct posture is established first, in case the underlying mechanical problem is in the abdomen or thorax. Once the proper posture is achieved, then exercises for the TMJ can begin. This system educates the patient to correct the primary cause of the mechanically induced TMD and gives the patient the tools to manage or prevent recurrences of TMD.

Impairments can be isolated to the TMJ and not part of a syndrome. The MSI exercises provide benefits to patients exhibiting bruxism and/or poor posturing of the mandible.

II. MATERIALS AND METHODS

Twenty-six patients with TMD (25 females, 1 male; mean age 31.88 ± 17.49 years) were seen in a university-based outpatient physical therapy practice between April 2002 and July 2007. The median level of disability for patients on intake was 22.5 on a 62 point TMJ Disability Questionnaire. A retrospective chart review was conducted of patients with TMJ pain and signs of joint disturbances (clicking/popping) who were treated with the Movement Systems physical therapy approach. This study received university IRB-approval. All patients were treated by the same orthopedic board certified physical therapist with 25 years of out patient orthopedic clinical experience. Patients were referred for TMJ pain and signs of joint disturbances (clicking/popping) by a mix of local physicians and dentists. The emphasis of these treatment sessions was to monitor and modify the patient’s home program of specific exercises aimed at restoring correct movement patterns of the TMJ and proper alignment of the jaw, head, neck, shoulder girdle and trunk. Patients received $4 \pm 2.46$ physical therapy treatment sessions over the course of 1.5 months on average.

Charts reviewed contained basic demographic information. A completed TMJ Disability Questionnaire outcome measure was provided by the patient on intake. Subjective pain complaints (pain/no pain) and a numeric pain rating score (0-10) were recorded on the initial and final visits as well. Objective measures analyzed
included gross jaw opening range of motion and jaw opening range of motion prior to the onset of joint disturbance (pain and/or clicking). Both measures were taken by the same physical therapist from the incisal edge of the maxillary incisors to the incisal edge of the mandibular incisors using the cervical range of motion instrument [CROM Deluxe, Performance Attainment Associates, St. Paul, MN]. Descriptive statistics were used to relay demographic information and level of disability of the patient sample. Paired t-tests were used for gross changes in total jaw opening range of motion as well as changes in range of motion prior to onset of joint pain/clicking. Simple percentages were used to show changes in subjective report of pain and signs of joint disturbances.

III. RESULTS

Data reveal a statistically-significant increase in active TMJ opening range of motion from 39.03 mm ± 8.66 before treatment to 42.04 mm ± 6.22 on follow-up (á=.01, mean difference 3.01 mm. 95% C.I. 1.47 to 4.55). These measurements were compared to the normative range of 45-55 mm active opening range of motion. Of the 26 charts reviewed, 16 patients had reported signs of joint disturbances (clicking/popping). Those 16 patients with signs of joint disturbances initially only achieved 29.12 mm ± 10.70 of active TMJ opening before the onset of clicking/popping. At follow up, they showed significant improvement with 39.94 mm ± 6.65 before the onset of clicking/popping (á=.001, mean difference 10.82 mm. 95% C.I. 8.90 to 12.74). While all patients reported a reduction in pain and signs of joint disturbance, 42% of patients with complaints of pain were pain-free at follow-up and 50% of patients with signs of joint disturbance reported no clicking/popping upon follow-up. The mean difference on numeric pain rating score from initial to final visit was 0.3 (not statistically significant at á=.01).

IV. DISCUSSION

A. Primary Findings / Hypothesis:

Currently the specific factors contributing to TMD are not fully understood. The data presented suggests that impairments not only in the TMJ region but also in the adjacent regions may be important to consider in the treatment of TMD. The Movement System Impairment approach to treatment of the TMD provides a patient specific exercise program that emphasizes correction of patient’s postural and movement impairments of the entire upper quarter region with particular attention to the alignment of cervical spine and precise movement of the mandible. The treatment approach focuses on
1) improving alignment in each region, 2) improving strength of cervical, scapulothoracic and trunk muscles, 3) eliminating compensatory movements of the adjacent regions especially the cervical spine during movement of the TMJ and 4) precise movement of the mandible during opening.

B. Proposed Mechanism of Movement Impairment in the TMJ:

Ideal arthrokinematic movement during TMJ opening should include simultaneous rotation and translation. [Otis, 2004] The primary muscles responsible for the rotation movement are the muscles that depress the mandible which include the suprahyoid and infrahyoid muscles. [Otis, 2004] The primary muscle responsible for the anterior translation movement is the inferior head of the lateral pterygoid. [Otis, 2004]

The common movement impairment that we observe with opening of the temporomandibular joint is greater anterior translation than rotation of the condyle. We propose that the common muscle imbalance that occurs with this movement impairment is greater recruitment of the lateral pterygoid and reduced recruitment of mandible depressors. Thus, the focus of treatment is to perform precise movement of the mandible with emphasis on recruitment of the mandible depressors while in ideal alignment of the cervical, thoracic and lumbar region. Instructing the patient to retract the mandible when opening usually results in diminished anterior translation and improved rotation of the condyle during opening. We have observed that attention to this precise motion and alignment of the cervical spine, scapulothoracic region, and lumbar spine often increases the amount the patient can open the mouth without complaint of clicking or pain within the first treatment session.

C. Examination Resulting in a Patient Specific Exercise Program:

Other authors have described the importance of posture as it relates to TMD. [Wright 2000, Komiyama 1999, Cleland 2004] They have described general posture exercises that are helpful in the management of TMD. The MSI approach of diagnosis and treatment requires a specific examination of the patient’s alignment and muscle impairments. Assessment of the alignment, strength and length of muscles in these regions results in a patient specific exercise program to address the patient’s impairments. Assessing the patient’s specific alignment and muscle impairments of the cervical, scapulothoracic, thoracic and lumbar region are critical. The most common impairment that we observed in the cervical region is a forward
head posture and/or increase extension of the upper cervical region. Addressing head and neck position before the initiation of precise movement of the mandible is critical. The correction of the patient’s thoracic and lumbar alignment faults also needs to be addressed. The most common thoracic alignment impairment is a varying degree of thoracic kyphosis. When the kyphosis alignment impairment is present the patient’s specific exercise prescription will include the best correction of the kyphosis alignment before initiation of arm, cervical and TMJ movement is required. We also observe non-ideal scapular alignment. Frequently, the scapulae are positioned in excessive abduction and/or depression. The patient’s scapula thoracic muscles usually test weak and require prescription of specific exercises to address the alignment of the scapulae and strengthening of the scapulothoracic muscles.

D. Patient Education:

In addition, the MSI treatment will educate the patient concerning their specific impairments and how they can modify daily habits and postures that could contribute to the patient’s pain problem. The more common habits that we have addressed include facial posturing and non-ideal cervical alignment. For example, the patient may have the habit of biting of the lower lip that could include repetitive protrusion and lateral deviation of the mandible. They may use bifocals that require repetitive posturing of upper cervical extension. These daily habits and positions could increase stress on the tissues in the TMJ region. The patient may not be aware of this habitual and repetitive activity that could contribute to their problem. Educating the patient concerning their habits and reducing the frequency of the postures are strategies to decreasing the stress on pain producing structures.

Assessment of the patient’s specific alignment and movement impairments is critical when treating patients with TMD. The MSI approach to examination, diagnosis and treatment provides a systematic method to produce a patient specific treatment to address the contributing factors to the patients with complaint of TMJ pain and joint disturbances.

E. Limitations or Suggestions for Future Research:

Anecdotally, we have informally communicated with some of our patients up to a year after treatment was completed. They have reported continued relief of symptoms. Future research should include long term systematic assessment of the effect of this treatment strategy on patient outcomes.
V. FINAL REMARKS

MSI trained physical therapists are concerned with aligning the body while providing good function. In this pilot study we conclude that the MSI approach to treatment of the entire body is successfully extended to the treatment of TMD movement syndrome. The MSI approach offers a unique array of benefits to the TMD patient: eliminate or reduce pain, restore function in the TMJ and trunk of body, non-invasive, efficient, cost effective and eliminate recurrences of TMD.

VI. REFERENCES


