Abstract

The term “Temporomandibular Disorders (TMD)” is a collective term used to describe a group of musculoskeletal conditions occurring in the temporomandibular region (Laskin et al., 1983). These conditions are characterized by pain in the muscles of mastication, the temporomandibular joint or both. In order to treat TMD, it is necessary to understand etiology and to establish a systematic procedure for differential diagnosis. The question is should we treat pain as a symptom or as a disease? Typically, treatment of TMD is driven largely by the physical diagnosis alone, without addressing the personal or psychological impact of TMD pain or the patterns of coping used for TMD patients. Although TMD is regarded by many as a condition in which psychosocial factors influence the course of the disease, little attention has been paid to assessing how psychological or psychosocial factors influence treatment outcome and whether successful clinical outcome is associated with improved psychosocial function. In this article, we discuss the various methods commonly used for biobehavioral assessment.

Keywords:
Temporomandibular Disorders (TMD), psychological, psychosocial, biobehavioral.
Introduction

The Temporomandibular Joint (TMJ) is one of the most complex joints in the body and is the area in which the mandible articulates with the cranium. The term “Temporomandibular Disorders (TMD)” is a collective term used to describe a group of musculoskeletal conditions occurring in the temporomandibular region (Laskin et al., 1983). These conditions are characterized by pain in the muscles of mastication, the temporomandibular joint or both. According to the American Society of Temporomandibular Joint Surgeons, Temporomandibular Joint Disorders (TMD) is a collective term embracing all the problems relating to the TMJ and related musculoskeletal structures. In order to treat TMD, it is necessary to understand etiology and to establish a systematic procedure for differential diagnosis. The question is should we treat pain as a symptom or as a disease? When only the symptom of pain is treated reocurrence is highly probable, whereas if the causes are eliminated, the prognosis of long term relief is much more favorable. The psychological, emotional, and behavioral factors can have a potential impact on the treatment of TMD. Fordyce and colleagues were the first to introduce the term chronic pain behaviors to emphasize that the management of chronic pain involves a rehabilitation rather than a cure model- that is, the objectives for the management of patients with chronic pain emphasize rehabilitating the patient to return to a useful and productive lifestyle and minimizing depression and other debilitating emotional states, rather than achieving a permanent cure for pain. The term biobehavioral assessment includes assessment of patient’s cognitive (i.e., thinking) and affective (i.e., emotional) status, as well as assessment of his or her current level of behavior (i.e., the extent to which behavior in social settings such as home, work or school, and even when seeking TMD treatment, is adaptive or maladaptive)- in sum, the current level of psychosocial function. Moreover, biobehavioral assessment may point to expanded treatment possibilities that fall within the realm of behavioral and cognitive-behavioral therapies. Lastly, assessment of biobehavioral status facilitates the establishment of a positive and optimistic doctor-patient relationship, or therapeutic alliance, and allows a collaborative set to be formed. A collaborative set refers to a dentist and patient working towards the same objectives, commonly held expectations are developed concerning what is to be done and why. Typically, treatment of TMD is driven largely by the physical diagnosis alone, without addressing the personal or
psychological impact of TMD pain or the patterns of coping used for TMD patients. Although TMD is regarded by many as a condition in which psychosocial factors influence the course of the disease, little attention has been paid to assessing how psychological or psychosocial factors influence treatment outcome and whether successful clinical outcome is associated with improved psychosocial function.

In this article, we discuss the various methods commonly used for biobehavioral assessment which may be included in evaluation of TMD patients and ultimately may help in an effective patient management.

**METHODS OF BIOBEHAVIORAL ASSESSMENT**

Several methods have evolved for the biobehavioral assessment of patients with chronic pain conditions. Most of these methods are reliable and valid for assessing other chronic pain conditions than for assessing TMD. However, TMD shares many biobehavioral characteristics with other common chronic pain conditions, and it is reasonable to assume that methods applicable to those conditions may be applicable to TMD as well. The four most widely used approaches to biobehavioral assessment of chronic pain patients are observational, self-report, self-monitoring and multiaxial.

**Observational Methods**

Direct observation of pain-related physical behaviors was first introduced by Fordyce in the management of chronic back pain; it was then extended and formalized by him into reliable and valid scales for measuring the impact of pain on physical movement. Methods for reliably observing and coding facial behavior for pain have been developed by LeResche and Dworkin and others. Based on a survey of current literature, it is fair to conclude that direct observational measures of TMD patients for biobehavioral assessment are not as well developed as the widely used self report measures.

**Self Report Methods**

The self-report methods include the use of interview schedules; symptom checklists; psychological and biobehavioral rating scales; and psychological tests assessing mental and emotional status, psychological adaptation, coping behaviors and health care utilization.

The most commonly used self report measures used for the biobehavioral assessment of chronic pain conditions are summarized below.

**Minnesota Multiphasic Personality Inventory (MMPI)**

Perhaps the most widely used instrument for psychological status, the MMPI is not intended as a diagnostic instrument but rather provides a personality profile of
psychological function. The test is long and takes highly specialized training to interpret, so its use is not suitable for many clinicians. Standardization samples used for MMPI scale construction are reported in several independent studies as not being appropriate for chronic pain patients. However, using clustering methods to identify MMPI scale profiles that characterize pain patients, including TMD patients, has proved somewhat more useful. Generally, whether using the MMPI or more recently revised and restandardized MMPI-2, elevations on scales 1, 2 and 3- hypochondriasis, depression and hysteria- were associated with perceptions of severe pain, affective disturbance and maladaptive patterns of psychological functioning.8

The MMPI has been used in many studies of TMD patients, and these studies support the conclusion that clinical psychopathology is present in an appreciable number of TMD patients presenting for treatment.9 Using the MMPI in a study predicting response to treatment for TMD, McCreary and associates10 found that somatization was related to jaw function problems at long term follow-up. They found that “somatization was a significant predictor of outcome” for chronic TMD patients and concluded, “if treatment does not address this somatization process, there is an increased risk there will be no improvement”. Thus, the MMPI may be potentially more useful if the patient is referred to a psychologist for administration and interpretation of test results.

SCL-90-R

The SCL-90-R11 is a 90-item symptom checklist that yields several scales, the most relevant of which are scales assessing depression, anxiety, and somatization. The SCL-90-R is much briefer than MMPI, but its overall usefulness with chronic pain patients has not been unequivocally established, and some problems have emerged related to its use in chronic pain populations. For example, there has been difficulty in replicating the original 10-factor structure of the entire SCL-90-R as observed by Derogatis.11 Nevertheless, the SCL-90-R has been used extensively to study all types of chronic pain populations, including TMD. When comparing the responses of chronic pain and psychiatric populations, the chronic pain population was distinguished, in studies by Buckelew and colleagues12, by reports of psychological distress limited to somatic, as opposed to emotional or cognitive, symptoms of anxiety and depression.

Multidimensional Pain Inventory (MPI)

Turk and colleagues13,14 developed the MPI; perhaps the most widely used self report measure, to assess the biobehavior and cognitive responses of patients with chronic pain. Unlike the
IMPATH and TMJ scales, its use is not limited to patients with TMD, and it has been extensively investigated for its psychometric properties, demonstrating acceptable levels of reliability, validity and predictability of pain response pattern. The measure has been found to yield three distinct patient clusters that appear consistently across diverse chronic pain conditions, including back pain, headache and TMD.

The chronic pain groups distinguished by the MPI are labeled adaptive copers, interpersonally stressed and dysfunctional and the three types reflect a continuum of increasing disability and pain-related psychosocial dysfunction. Turk and Rudy\textsuperscript{13} demonstrated that TMD patients characterized as dysfunctional show significantly elevated depression and report significantly more physical symptoms than those TMD patients that the MPI categorizes as adaptive copers. More recently, Rudy and colleagues\textsuperscript{15} used the MPI to assess the relative efficacy of a cognitive-behavioral treatment intervention compared with physical treatment involving the use of an intraoral occlusal splint. They presented evidence that dysfunctional versus adaptive copers and interpersonally stressed patients responded differentially to these treatments, supporting their conclusion that clinical treatment decisions for TMD patients should include not only assessment of biobehavioral status but also assignment to treatment interventions specifically based on the assessed level of psychological function. The MPI is one of the most carefully designed and well-studied self-report measures for assessing biobehavioral and psychological functioning in chronic pain patients.

**Illness Behavior and Sickness Impact Measures**

The Illness Behavior Questionnaire (IBQ) by Pilowsky\textsuperscript{16} and the Sickness Impact Profile by Bergner and associates\textsuperscript{17} were developed for assessing the psychological and biobehavioral impact of illness beliefs. These measures have provided useful information about biobehavioral adaptation to chronic pain, including disability associated with chronic pain conditions and differences in beliefs and expectations between pain clinic populations and chronic pain patients seeking treatment elsewhere. The results of these measures have appeared in the TMD literature, supporting the conclusion that for a significant minority of clinical cases, TMD has an appreciable impact on personal functioning, but neither the IBQ nor the SIP is in common use by TMD clinicians and researchers.

**Pain Coping Measures**

A well known and widely used measure of pain coping developed by Keefe and Gill\textsuperscript{18} indicates that passive
coping strategies, particularly catastrophizing and praying, seem to be common among those who respond less well, biobehaviorally and emotionally, to their chronic pain problems. Supporting data comes from the use of measure developed by Brown and Nicassio\textsuperscript{19} that indicates that those who use active rather than passive pain coping styles and those who perceive themselves as having some control over their pain conditions remain better able to minimize the personal and psychological negative impact.

Numerous additional measures exist that assess diverse dimensions of the chronic pain experience. These include the Ways of Coping Checklist\textsuperscript{20}, which measures coping with stress not specific to chronic pain; measures of daily stress used by Lennon and colleagues\textsuperscript{21} to study the psychosocial adaptation of TMD patients; and the Millon Biobehavioral Health Inventory, the Chronic Illness Problem Inventory, the Psychosocial Pain Inventory, and the Pain Beliefs Questionnaire.\textsuperscript{6,21} Reports using these measures, taken together, confirm the extent to which TMD can be disabling for an appreciable segment of TMD sufferers.

### TMJ Scale

The TMJ Scale\textsuperscript{23,24,25,26} was developed as a self-report measure for use in the home or office and assesses three domains: physical, psychosocial and global. The physical domain includes assessment of pain, and the psychosocial domain assesses psychological factors and stress. The scale, which has reportedly been used quite extensively, requires scoring and interpretation by its developers. It yield information that may be useful for clinicians treating TMD, although some questions about its validity as a psychosocial assessment tool have been noted by Rugh and coworkers\textsuperscript{27} and by Deardorff\textsuperscript{7}, as well as by others. Findings from the TMJ Scale indicate that women with TMD report a higher level of severity of all physical and psychological symptoms compared with men, and a relationship between severity of psychological problems and chronicity of TMD has been noted.

### IMPATH Scale

The IMPATH Scale for TMD is an interactive computer-based assessment instrument developed at the University of Minnesota by Fricton and colleagues for use as a screening and personal history instrument.\textsuperscript{28} It has the advantage of instantaneous feedback, but unfortunately, the psychometric characteristics of its illness behavior components have not yet been well established. However, like the TMJ Scale, it may serve as a useful guide for clinicians wishing to obtain a clinical impression of how their patients are doing psychologically and biobehaviorally.
Self Monitoring Methods

Self monitoring has been used extensively for decades for a wide variety of clinical problems, and is clinical uses are limited only by the imagination of the clinician and the cooperation of the patient. Its implementation can range from a request from the clinician to observe a simple phenomenon to a multicolumn table that lists time of day, pain intensity, mood state, cognitions and behaviors over the preceding 30 minutes, to be completed by the patient after each pain episode for 2 weeks. Self monitoring was first used for TMD patient assessment to record parafunctional behaviors.

Multiaxial Diagnostic And Assessment Methods

Methods that seek to integrate physical and biobehavioral factors into a multiaxial diagnostic and assessment instrument have been developed in recognition of the well-established relationship among physical, behavioral and psychological factors.

The International Association for the Study of Pain (IASP) Classification of Chronic Pain and Description of Chronic Pain Syndromes uses five axes applicable in the assessment of all chronic pain conditions. Axis I is used to record the body region in which the pain sites occur; axis II designates the physiologic system (e.g., musculoskeletal, cutaneous, nervous) that is functioning abnormally and giving rise to pain; axis III reflects temporal characteristics and patterns of occurrence (e.g., single episode, continuous, fluctuating); axis IV captures the patient’s statement of pain intensity and time since onset (e.g., mild, of 1 month or less duration, severe, of more than 6 months duration); and axis V is reserved for etiology and includes dysfunctional and psychological origin categories as well as designation of the etiology as genetic, inflammatory, and so forth.

Research Diagnostic Criteria FOR TMD (RDC/TMD)

The RDC/TMD guidelines provided standardized criteria for a two-axis diagnosis. This means that, along with a physical diagnosis (axis I), the patient receives a psychosocial diagnosis as well (axis II).

1. The axis I of the RDC/TMD classification system is a clinically-based assessment taking into account for both anamnestic and clinical parameters of evaluation. It provides criteria for the diagnosis of three main groups of disorders: muscles disorders (group I), disc displacements (group II) and other joint disorders, such as arthralgia, osteoarthritis and osteoarthrosis (group III).

a) Muscle disorders (group I) are diagnosed on the basis of anamnestic
reports of pain in the muscles of mastication and clinical assessments of pain at palpation of at least three out of twenty muscular sites in the facial area (ten for each side). The only distinction among muscle disorders is made when mouth opening is less than forty millimeters. When criteria for group I diagnosis are satisfied, a diagnosis of myofascial pain has to be put, and it will be with or without restricted mouth opening on the basis of the jaw range of motion.

b) The diagnostic group of disc displacements (group II) aims to detect conditions in which the temporomandibular joint disc is anteriorized with respect to the mandibular condyle. Three diagnostic subgroups are identified: displacements with reduction and displacements without reduction with or without restricted mouth opening. The main criteria to diagnose disc displacement with reduction is the presence of a click sound during jaw movements that has to reciprocal (audible during both jaw opening and jaw closing movements) and not fixed (audible at different stages of motion during the jaw opening and jaw closing movements). A disc displacement without reduction is diagnosed when a history of previous click sounds is accompanied by their absence at clinical assessment and by a deflection during jaw opening. When the mouth opening is less than thirty-five millimeters a diagnosis of displacement without reduction with restricted mouth opening can be put, while a mouth opening of more than the cut-off value points toward the diagnosis of disc displacement without reduction without restricted mouth opening.

c) The third group of diagnoses, arthralgia, osteoarthritis and osteoarthrosis (group III), is based upon joint palpation, accordingly to the presence of pain at palpation and crepitation sounds, alone or combined.

2. As for psychosocial diagnosis (axis II), a rating of jaw disability, chronic pain, and depression is provided by the use of validated questionnaires, thus allowing to assess psychosocial aspects that have to be addressed at therapeutic level.

The RDC/TMD guidelines do not allow a diagnosis of less frequent conditions or pathologies that do not show a clear origin and natural progression (such as traumatic injuries, neoplasm of condyle, acute traumatic injuries, polyarthritis, atypical facial pain, and headaches). They actually represent the standard of reference for TMD diagnosis and classification in the research setting, also allowing cross-cultural and multicenter comparisons both in patient and non patient populations.31

The points of strength of the RDC/TMD classification (standardization of criteria, simple taxonomic groups), which have led
to their wide diffusion among epidemiologists and researchers, are not so helpful in the clinical setting, where the use of a wider classification system providing etiopathogenetic information as well should be more indicated. This is the reason for the diffusion of the American Academy of Orofacial Pain (AAOP) classification system as a widely adopted scheme for TMD assessment in the clinical setting.

Conclusion

The assessment and management of biobehavioral aspects of a patient presenting with a TMD are crucial to a satisfactory treatment outcome, whether the treatment required is conservative or surgical.

A great deal more research is needed before it is possible to adequately evaluate how biobehavioral interventions achieve their desired effects and which components of the multimodal approaches now in common use are most potent. Perhaps of greatest interest is the need to develop treatment approaches tailored to both the physical and biobehavioral status of the patient, as recently advocated with the introduction of the RDC/TMD.

Too often, well documented resistance still accompanies a recommendation for the inclusion of psychologically based treatment for TMD. It is unfortunate if unhealthy and unwarranted negative misapprehensions prevent any TMD patient from being helped through the use of readily available, scientifically sound, and safe methods that integrate biomedical and biobehavioral treatments for TMD.

References


