Management of Temporomandibular Disorders

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Abstract

Objective: To provide physicians and the general public with a responsible assessment of management approaches to temporomandibular disorders (TMD).

Participants: A non-Federal, nonadvocate, 15-member panel representing the fields of clinical dentistry, medicine, surgery, cellular and molecular biology, epidemiology, biostatistics, immunology, behavior and social sciences, pain management, and tissue engineering. In addition, 23 experts in clinical dentistry, medicine, surgery, cellular and molecular biology, epidemiology, biostatistics, immunology, behavioral and social sciences, pain management, and tissue engineering presented data to the panel and a conference audience of 1,083.

Evidence: The literature was searched through Medline and an extensive bibliography of references was provided to the panel and the conference audience. Experts prepared abstracts with relevant citations from the literature. Scientific evidence was given precedence over clinical anecdotal experience.

Consensus Process: The panel, answering predefined questions, developed their conclusions based on the scientific evidence presented in open forum and the scientific literature. The panel composed a draft statement that was read in its entirety and circulated to the experts and the audience for comment. Thereafter, the panel resolved conflicting recommendations and released a revised statement at the end of the conference. The panel finalized the revisions within a few weeks after the conference.

Introduction

Temporomandibular disorders (TMD) refer to a collection of medical and dental conditions affecting the temporomandibular joint (TMJ) and/or the muscles of mastication, as well as contiguous tissue components. Although specific etiologies such as degenerative arthritis and trauma underlie some TMD, as a group these conditions have no common etiology or biological explanation and comprise a heterogeneous group of health problems whose signs and symptoms are overlapping, but not necessarily identical. Depending on the practitioner and the diagnostic methodology, the term TMD has been used to characterize a wide range of conditions diversely presented as pain in the face or jaw joint area, headaches, earaches, dizziness, masticatory musculature hypertrophy, limited mouth opening, closed or open lock of the TMJ, abnormal occlusal wear, clicking or popping sounds in the jaw joint, and other complaints. The severity of these presenting conditions may range from noticeable but clinically insignificant signs to seriously debilitating pain or dysfunction.

Given this variation among the problems labeled TMD, it is not surprising that controversy has emerged. Even the name TMD is not universally endorsed. Generally accepted, scientifically based guidelines for diagnosis and management of TMD are still unavailable. Even so, practitioners representing a variety of disciplines and specialties have responded

to their patients' needs by developing and employing a broad range of treatment approaches that include educational or behavioral counseling, pharmacological or mechanical approaches, occlusal therapies, and a variety of surgical procedures, or combinations thereof. In many cases, patients have improved, and in others for example, in cases involving the use of certain alloplastic implants the results have been disastrous. For the majority of TMD patients, the absence of universally accepted guidelines for evaluation and diagnosis compromises the goals of consistent and conservative therapy. The lack of standard treatment protocols accepted across professional specialties means that many patients and practitioners may attempt therapy with inadequately tested approaches.

This conference brought together specialists in clinical dentistry, medicine, surgery, cellular and molecular biology, biostatistics, epidemiology, immunology, behavioral and social sciences, pain management, tissue engineering, and representatives of the public, including TMD patients and advocacy groups. After 1-1/2 days of presentations and audience discussion, this independent, non-Federal technology assessment panel weighed the scientific evidence and the experience of patients and practitioners and developed a draft statement that addressed the following questions:

- What clinical conditions are classified as temporomandibular disorders, and what occurs if these conditions are left untreated?
- What types of symptoms, signs, and other assessments provide a basis for initiating therapeutic interventions?
- What are effective approaches to the initial management and treatment of patients with various TMD subtypes?
- What are effective approaches to management and treatment of patients with persistent TMD pain and dysfunction?
- What are the most productive directions for future research, and what types of new collaborations and partnerships should be developed for pursuing these directions?

1. What Clinical Conditions Are Classified as Temporomandibular Disorders, and What Occurs If These Conditions Are Left Untreated?

Classification of Clinical Conditions

From the information provided, the clinical conditions usually classified as TMD include those with pain or dysfunction in the joint or contiguous structures. These conditions are linked in their presentation by their common signs and symptoms. Given the lack of epidemiological information and the collection of as yet undefined etiologies that are likely

to be described as TMD, a conventional disease classification system would be difficult to describe, possibly mis-leading, and unlikely to receive broad acceptance. For the time being, therefore, classification must depend primarily on the detailed description of symptoms and underlying conditions. "Parameters of Care for Oral and Maxillofacial Surgery" (1995), developed by the American Association of Oral and Maxillofacial Surgeons, provides useful information of this type.

Conditions primarily affecting the muscles of mastication include systemic diseases of muscles such as polymyositis, dermatomyositis, hereditary myopathies, and changes in the musculature secondary to functional disturbances. Conditions affecting the TMJ include arthritis, ankylosis, growth disorders, recurrent dislocation, neoplasia, condyle fracture, and systemic illness. With respect to both muscular and joint changes, those classified as functional affliction of the muscle or pathology of the joint or a combination of both are most often categorized as TMD. It should be noted that affliction of either the joint or the muscle may lead to secondary changes in the other structure that become a further source of pain and functional impairment.

Although current diagnostic classifications of TMD are based on signs and symptoms rather than on etiology, these signs and symptoms should be classified in the larger context of other muscle and joint disorders or in the category of pain disorders. Lessons can be learned from diagnostic and therapeutic approaches to other joint and muscle diseases. For example, less controversy exists in hip joint diagnosis or treatment, where etiologic classifications are better established. On the other hand, there appears to be similar controversy in conditions of the lumbo-sacral spine, such as low back pain. As with TMD, diagnosis and treatment of low back pain may involve a number of potential etiologies that are difficult to differentiate and require participation of multiple disciplines or specialties.

What Occurs If These Conditions Are Left Untreated?

Well-designed, representative, cross-sectional and longitudinal studies are scarce. Consequently, the natural history of TMD is not well defined. In addition, most studies are descriptive, with analyses that are predictive or explanatory virtually absent. The limited, population-based epidemiological data available indicate that the prevalence of self-reported symptoms, such as pain and restriction of movement, is between 5 and 15 percent, with no gender differences and peak prevalence in young adults (20-40 years of age). Some recent studies, however, show greater prevalence of self-reported facial pain in women of child-bearing age, and a number of clinical case series studies reflect an overwhelming predominance of women in the third and fourth decades. The reported discrepancies in gender differences require explanation. The lower prevalence of TMD signs and symptoms at older ages reported in cross-sectional data is consistent with self-

limiting signs and symptoms, and the few longitudinal clinical studies support these findings. There is no information on ethnic or racial variation in these rates.

In clinical case series studies in which conservative, reversible, noninvasive therapy was emphasized, the presenting signs and symptoms appeared to improve in the vast majority of patients. In remaining patients, symptoms may persist, recur, or worsen. Few data are available that assess the long-term course of these patients in the absence of an intervention. Limited data indicate that many symptomatic people do not seek treatment. Similarly, minimal data are available from which to assess the natural history of this group of patients. Although it has been suggested that societal barriers and prejudices often prevent appropriate treatment of TMD patients, these relationships have not been documented in the research.

2. What Types of Symptoms, Signs, and Other Assessments Provide a Basis for Initiating Therapeutic Interventions?

Any initiation of therapy must be based on a thorough and sensitive analysis of the patient. Although some signs and symptoms associated with certain intra- and extracapsular disorders are well established, the etiology of others remains ambiguous and a challenge to the practitioner. Although numerous assessment methods are available, lack of evidence of the diagnostic value of these tools (i.e., their validity, reliability, specificity, sensitivity, and cost-effectiveness) contributes to this ambiguity. Diagnosis and initial treatment, therefore, often depend on the practitioner's experience and philosophy, rather than on scientific evidence.

Nonetheless, the consensus is that diagnosis and initiation of treatment should be based on data from physical examination and should include medical and dental history, information about audiological, speech, and swallowing problems, pain and dysfunction, and consideration of psychosocial factors, as well as data from imaging and other diagnostic tests. Evaluation should encompass examination of orofacial tissues, musculature, and neurological function. Particular attention should be paid to determinations of functional range of motion, occlusal status, existence of parafunctional conditions (e.g., clenching, grinding), and the presence of joint or muscle tenderness and cutaneous hyperalgesia. Psychosocial assessments should determine the extent to which pain and dysfunction interfere with or diminish the patient's quality of life. However, the consideration of psychosocial factors has the potential for inappropriate use, and it is imperative that such assessments be managed by skilled professionals using validated instruments.

Currently available epidemiological evidence suggests that TMD is frequently self-limiting. The practitioner and the patient must strive to develop a treatment plan that is evidence based and patient centered. In devising any treatment plan, the practitioner must weigh the

patient's perception of pain and dysfunction and the impact of these on the patient's quality of life. In the absence of overt pathology, some patients and practitioners may work together to implement a program of patient self-management with education and an understanding of the role of personal factors. If the patient does not obtain adequate relief from these measures, a number of conservative, noninvasive, and reversible treatments can next be considered.

At present the evidence is insufficient to warrant prophylactic intervention for management of TMD, nor are there data providing clear evidence that orthodontic treatment prevents, predisposes to, or causes TMD. Even so, some practitioners have carried out occlusal adjustments, extensive restorations, or management of displaced disks or joint sounds in the absence of pain or loss of function. Given current evidence, special emphasis should be placed on the avoidance of extensive restorative procedures to treat a disorder that may change over time.

3. What Are Effective Approaches To the Initial Management and Treatment of Patients With Various Tmd Subtypes?

Initial management is defined as the first treatment the patient receives after seeking care. Pain and dysfunction of the masticatory apparatus can be a frightening and disabling experience for patients. The TMJ is important functionally with regard to speech, social interactions, mastication, swallowing, and other oral functions, as well as hearing, in some cases. Patients seeking care deserve careful attention, given the importance of this area of the body.

The initial management of TMD described below assumes that underlying systemic or overt joint diseases have been identified and addressed. Patients with joint arthropathies and painful jaw muscle conditions associated with systemic disease require treatment for the underlying disease. While these patients may also need therapy directed specifically to the TMJ and related structures, such treatment must be carefully coordinated with that provided for systemic disease. When there is disease of the TMJ itself (such as neoplasias, which frequently require surgical therapy), that disease must be the primary focus of treatment.

Although a vast array of therapeutic modalities have been offered for TMD patients, there is a paucity of clinical studies, and especially randomized controlled clinical trials, to guide management of these patients. Given that most patients have a self-limited disorder and that a variety of different therapies appear to result in similar improvements in pain and dysfunction, caution is urged with regard to use of invasive and other irreversible treatments, particularly in the initial management of TMD.

A number of noninvasive and reversible therapies are widely used and appear to help many

patients. Optimally, these therapies should have low morbidity and minimal alteration of underlying anatomic structures. These therapies include:

- **Supportive patient education.** Initial attention should be given to the issue of patient education on what is known about TMD and the fact that most of these problems follow a benign course. Many experts recommend that patients undergo education directed at eliminating certain behaviors perceived to be harmful, such as clenching and grinding. Some experts recommend exercise and stress management. Rest and dietary modifications may help some patients.
- **Pharmacologic pain control.** Medication may be useful for initial symptom management. The medications useful for TMD are similar to those useful for other painful musculoskeletal conditions. Nonsteroidal anti-inflammatory drugs (NSAIDs) and opiates are the mainstay of pharmacological pain treatment. Some clinicians also have found muscle relaxant medications and low-dose antidepressants of a sedating type to be useful in initial management of TMD. Other medications also have been used for specific indications. In all cases, the clinician must weigh the risk of side effects against potential benefits, a long with his or her own professional competence in the administration and management of such medications.
- **Physical therapy.** Physical therapy applications to TMD include a wide variety of evaluative techniques and treatment modalities that have been commonly used in other neurological and musculoskeletal disorders. These therapies generally are conservative and noninvasive. Benefits to TMD patients have been described, although few data are available to document these results.
- **Intraoral Appliances.** Stabilization splints are considered noninvasive and reversible and are recommended by many experts for early treatment of these patients. It is important that these appliances are of a type that does not lead to major alteration of the patient's occlusion. Repositioning appliances may appear to be noninvasive but have potential for creating such irreversible changes in occlusion and, consequently, the possibility of precipitating other problems.

After these initial therapeutic interventions, a small number of patients may continue to exhibit symptoms associated with the TMD constellation of conditions. These patients will require consideration for longer term and/or more invasive therapies.

4. What Are Effective Approaches To Management and Treatment of Patients With Persistent Tmd Pain and Dysfunction?

An important minority of TMD patients progress to persistent pain and/or dysfunction. This minority represents a heterogeneous group of disorders. There are few randomized controlled clinical trials to give us guidance regarding the treatment of patients with

persistent pain. Although many of the conservative modalities that were implemented in the initiation of treatment may continue to be used, other strategies may require consideration during this phase of treatment.

For the patient with episodic signs and symptoms, a noninvasive, conservative approach should be implemented. For the patient with persistent, nonremitting signs and symptoms, a stepwise approach should be implemented. In some cases, these treatments are intended to provide symptomatic care, whereas in others they are intended to alter the course of the condition. Although some treatments restricted to the TMJ and oral structures have been overemphasized, other treatments such as pharmacotherapeutics appear to have been underutilized, or inappropriately used.

As the intervention becomes increasingly aggressive, invasive, and irreversible, the patient and practitioner should share a common understanding of the scientific basis, indications, goals, risks and benefits, and prior history of the proposed intervention. It should be clearly recognized that surgery is indicated in only a small percentage of patients.

From the data provided, no single treatment or combination of procedures was demonstrated to be effective in randomized, controlled clinical trials. Given the lack of evidence, no specific recommendations can be made. However, the following would be useful to advance the care of patients with persistent TMD pain and dysfunction.

Pharmacological Therapies

The principles for management of the pain associated with persistent TMD are the same as those for treatment of other chronic pain conditions. Opiates and NSAIDs are recognized as mainstays for analgesic management and should be implemented commensurate with the level of pain.

A major concern regarding the use of opiates in the past has been the potential of addiction, analgesic tolerance, uncontrolled side effects, and toxicity associated with long-term use. More recent work, however, suggests that these concerns often are not warranted and that many chronic pain patients, treated with adequate doses of opiates, can achieve successful control of symptoms without adverse effects.

Adjuvant analgesics represent a diverse group of drugs, including tricyclics, anti-depressants, anticonvulsants, membrane stabilizers, sympatholytic agents, and others. These groups of drugs are likely to be more efficacious in neuropathic pain states but may be considered for patients who respond poorly to or are unable to tolerate NSAIDs and opiates.

Pain disorders may result in impaired sleep. Hypnotics may be useful to improve sleep patterns, which in turn benefit the patient's overall health status. Many pain experts believe that a major comorbidity associated with chronic pain is depression and that medical therapy of depression may confer benefit to such patients.

Occlusal Therapies

Some experts believe occlusal adjustment may be helpful in this group of patients, and some experts also argue that occlusal adjustment should be performed before surgical procedures. Randomized trials are needed to establish the effectiveness of such approaches. Based on available information, however, occlusal adjustments that permanently alter a patient's occlusion should be avoided.

Surgical Approaches

Randomized controlled clinical trials to support the efficacy of individual surgical procedures have not been performed. A spectrum of surgical interventions has been applied to the group of patients with pathology of the TMJ. These approaches include arthrocentesis, arthroscopy, arthrotomy/arthroplasty, condylotomy, orthognathic surgery, and even total TMJ replacement.

Indications for surgery include one or more of the following: moderate to severe pain, dysfunction that is disabling, and/or evidence of pathological conditions. Experts who perform these procedures quote high rates of success in this highly select group of patients; however, a small percentage of these patients experience deterioration of their conditions.

The use of certain alloplastic implants in surgery for TMD has resulted in disastrous consequences for many patients who have undergone such treatment. Consequently, utmost caution must be utilized in considering the use of any implants. At the same time, it is recognized that certain patients are in need of implants, and newer implant designs need to be fully assessed as quickly as possible. For patients who already have had implant or other invasive surgery, additional surgical interventions (with the possible exception of implant removal) should be considered only with great caution, since the evidence indicates that the probability of success decreases with each additional surgical intervention. For such patients, the most promising immediately available treatment may be a patient-centered, multidisciplinary, palliative approach.

Psychosocial Issues

Patients with persistent TMD problems may suffer psychologically and socially because of pain and dysfunction. Failed treatments and recurrent pain episodes contribute to life stresses with a pattern of frustration, hopelessness, and even depression. The life stress associated with persistent pain and dysfunction related to TMD has not been adequately understood from the patient's perspective or from the perspective of impact on social functioning.

Psychological treatment strategies have not always been tailored to the individual needs of TMD patients. Nor does there appear to be a well- accepted model for supportive treatment environments for patients who have entered the phase of TMD characterized by persistent pain and dysfunction, although some such approaches are under development. Along with functional impairment, patients with TMD may experience esthetic impairment associated with failed interventions and/or persistent pain. The resulting negative self-image, disappointment, and frustration add to the stress associated with TMD. Psychological strategies established for other chronic conditions may be useful in supporting patients managing persistent pain, social debilitation, and the ensuing life stress associated with TMD. Relaxation and cognitive behavioral therapies have been shown to be effective in managing chronic pain, although data from controlled studies are not available regarding their efficacy in the management of pain associated with TMD.

5. What Are the Most Productive Directions for Future Research, and What Types of New Collaborations and Partnerships Should Be Developed for Pursuing These Directions?

The following directions for future research should be considered:

- At present, TMD is best described and diagnosed in the context of detailed information about presenting symptoms and full assessment of related factors and conditions. A more conventional disease classification system would be difficult to develop, and could be misleading, given that (a) necessary epidemiological information is lacking, and (b) the etiologies underlying the conditions called TMD have not been adequately defined and described. Carefully designed, analytical, cross-sectional, population-based studies with appropriate clinical measures and biological markers should be conducted to identify the prevalence of presenting signs and symptoms for TMD, excluding well-defined systemic conditions. These studies should identify associations with potentially predisposing and precipitating conditions. Frequently reported gender differences warrant further investigation.
- Validated diagnostic methods for identification and classification of TMD patients are needed. The diagnostic value of these assessment techniques should be established

with respect to the criteria of sensitivity, specificity,reliability, and cost-effectiveness.

- When sufficient data are available, a multidisciplinary classification system based on measurable criteria should be developed as the first step in a rational approach to developing diagnostic protocols and appropriate treatment modalities. This approach should lead to a labeling of "subtypes" that could permit the elimination of the term TMD, which has become emotionally laden and contentious.
- Randomized, controlled clinical trials are needed to determine the efficacy of TMD treatments. These studies should include both measures of clinical outcome and cost-effectiveness.
- Longitudinal studies should be conducted to identify both the natural history of the nonspecific signs and symptoms associated with TMD and the potential risk factors using predictive and explanatory statistical methodologies. These studies should be designed to elucidate the relationship between signs and symptoms, and etiology.
- Treatment protocols should be developed for approaches aimed at fostering the patient's control and sustaining or enhancing social functioning. Research should also be directed at understanding self-management of TMD signs and symptoms.
- There is an obvious need for basic research with respect to TMD. This research should include both human and animal research into the mechanisms of persistent pain associated with the orofacial region, the risk factors for persistent pain and/or dysfunction, the risk factors and cost-benefit considerations of long-term opioid use in the treatment of TMD, the etiology of gender differences, and the biomechanics of the TMJ and implants.
- Innovative methods directed at the construction of prostheses from living tissue should be encouraged. Bioengineers can make important contributions to TMD research, including studies on the mechanical properties, biostability, and biocompatibility of materials used in implants.

Conclusions

Evidence presented at the technology assessment conference led to the following conclusions:

- There are significant problems with present diagnostic classifications of TMD, because these classifications appear to be based on signs and symptoms rather than on etiology.
- Consensus has not been developed across the practicing community regarding many issues including which TMD problems should be treated and when and how they should be treated.
- The preponderance of the data does not support the superiority of any method for

initial management of most TMD problems. Moreover, the superiority of such methods to placebo controls or no treatment controls remains undetermined. Because most individuals will experience improvement or relief of symptoms with conservative treatment, the vast majority of TMD patients should receive initial management using noninvasive and reversible therapies.

- The efficacy of most treatment approaches for TMD is unknown, because most have not been adequately evaluated in long-term studies and virtually none in randomized controlled group trials. Although clinical observation can provide direction, these insights must be followed by rigorous scientific evaluation.
- There are no data to support some commonly held beliefs. For example, evidence is insufficient to warrant prophylactic modalities of therapy. Additionally, available data are not persuasive that orthodontic treatment prevents, predisposes to, or causes TMD. Therapies that permanently alter the patient's occlusion cannot be recommended on the basic of current data.
- Although noninvasive therapies are clearly preferred for most TMD problems, in the small percentage of patients with persistent and significant pain and dysfunction who show evidence of pathology or that an internal derangement of the TMJ is the source of their pain and dysfunction, and for whom more conservative treatment has failed, surgical intervention should be considered.
- The most promising approaches to management and treatment of patients with persistent TMD pain and dysfunction may result from evidence-based practice and patient-centered care. Relaxation and cognitive behavioral therapies are effective approaches to managing chronic pain. Physical therapy approaches need to be scientifically evaluated, as do alternative medicine modalities.
- Future advances in diagnosis and treatment of TMD will occur as the result of multidisciplinary collaborations among a number of fields involving basic and applied science and practice.
- Professional education is needed to ensure proper and safe practice in the treatment of TMD, especially with regard to pharmacological, surgical, and behavioral approaches. Moreover, if patients are to know where to seek help, and if insurance companies are to fully acknowledge the need for treatment of TMD, a consensus must be developed regarding the professional expertise needed to diagnose and treat these serious health problems.

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