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Guide for the Diagnosis and Management of Temporomandibular Disorders and Related Musculoskeletal Disorders

Dr. David Mock
Professor and Dean, Faculty of Dentistry, University of Toronto
Associate Director, Wasser Pain Management Centre, Mount Sinai Hospital, Toronto, Ontario

Dr. Howard C. Tenenbaum
Associate Dean, Diagnostic and Biological Sciences
Professor, Periodontology
Faculty of Dentistry, University of Toronto

Dr. Gerald Baker
Diplomat, American Board of Oral and Maxillofacial Surgery
Assistant Professor, Faculty of Dentistry, University of Toronto
Head, Division of Oral and Maxillofacial Surgery, Mount Sinai Hospital

Dr. Norman M.R. Thie
Clinical Director, TMD/Orofacial Pain Clinic
Clinical Associate Professor, Faculty of Dentistry, University of Alberta

PREAMBLE

Temporomandibular disorders (TMD) are a complex of ailments involving the temporomandibular joints themselves and associated structures. Although most are poorly understood, it is generally accepted that the aetiology is most often multifactorial, with various predisposing, precipitating and perpetuating factors. At present, there is no evidence to support the hypothesis that these conditions are always progressive and there is considerable evidence supporting the concept that in many cases, clinical remission occurs without treatment. Therefore, the need for and the nature of treatment should be considered carefully and weighed in this light. A decision to treat, and how to treat should be based on a detailed and relevant clinical history and careful clinical examination and centred on conservative, reversible therapies.

It must be recognized that TMD symptoms may mimic other pain conditions and *vice versa* and therefore it is critical for the practitioner to have an understanding of other causes of orofacial pain in order to diagnose and treat TMD successfully. This guideline, though, is not meant to serve as an exhaustive treatise on diagnostic and treatment strategies for all forms of orofacial pain and focuses on the diagnosis and management of TMD. Other causes of facial pain not originating from the temporomandibular apparatus may need to be considered, including, but not limited to, the neuralgias (e.g. trigeminal neuralgia, atypical facial pain), demyelinating diseases, CNS tumours, peripheral tumours, vascular headaches, muscle contraction-type (tension-type) headaches, dentoalveolar disease, sinus disease, ear disease, salivary gland disease and psychiatric/ psychological disorders.

The guiding principle of any treatment must be "*primum non nocere*" or, freely translated, "above all, do no harm". Irreversible procedures should only be considered after attempts at treatment with more conservative measures have failed and only if the severity and/or persistence of the patient's symptoms warrant. However, it cannot be over-emphasized that failure to respond to conservative treatment is not *a priori* an indication to proceed to irreversible or invasive therapies. In this regard, there must still be clear indications that in and of themselves point to the need for a specific invasive or irreversible treatment approach. Hence, the relative risks and benefits of the treatment versus the untreated symptoms must always be weighed. Before any procedure that may permanently alter the patient's dentition or jaw relationships is initiated, the patient must be well informed of the risks and therefore be a party to any decision to proceed.

Re-evaluation during the course of treatment is equally important to ensure that the diagnosis is correct and the course appropriate.

EDUCATIONAL REQUIREMENTS

The majority of patients presenting in the dental office with signs and symptoms of a TMD can be assessed and treated appropriately by any properly trained general dentist. Appropriate education and training (undergraduate or continuing education programs) should:

- promote the concept of diagnosis-based treatment with conservative, reversible treatment modalities;
- emphasize the multifactorial, biological and functional basis of TMD;
- foster an understanding of the anatomy, physiology and pathology of the temporomandibular joints, associated musculature and related structures, as well as the behavioural and psychosocial aspects of these and related chronic pain disorders;
- expose the student or practitioner to the various options in conservative patient management;
- include a discussion of the potential adverse effects of the various treatment modalities;
- instil in students and practitioners the importance of co-operating and collaborating, where appropriate, with other health practitioners who have been trained to diagnose and render rational treatment of temporomandibular disorders. These include other dentists, dental specialists, physio-therapists, psychologists, physicians and various specialists;
- allow the student or practitioner to determine when treatment is warranted and discourage therapy that is unnecessary, impractical or potentially detrimental to the patient;
- teach the student or practitioner to critically evaluate the literature and research on new

concepts, treatment methods and diagnostic aids, equipping him or her to reject concepts, treatment modalities or devices that lack scientific validation; and
- result in the student or practitioner having an understanding of the other painful disorders and diseases that afflict the craniofacial complex, equip him or her with the knowledge and capability to differentiate these from temporomandibular disorders and refer the patient accordingly.

Continuing education programs or short courses that promote one method of treatment, a product or that focus on specific diagnostic tools are usually inadequate. As well, practitioners who have taken any number of short courses should recognize that these do not impart specialty status.

An Oral and Maxillofacial Surgeon who has successfully completed a residency in any accredited program in North America may have had adequate opportunity to assess and operate on patients with temporomandibular disorders. Additional training might be necessary where the training program did not provide adequate exposure to all diagnostic and therapeutic modalities.

Continuing education in the diagnosis and management of TMD is widely available throughout North America and should represent a part of the clinician's continuing dental education activities if he or she is to remain competent in the management of patients with this complex of disorders.

PROFESSIONAL RESPONSIBILITIES

PATIENT HISTORY

As with all dental treatment, a careful medical and dental history should be obtained before any treatment is contemplated. It is assumed that TMD investigation and treatment will only be initiated after any specific odontogenic basis for the patient's complaint has been ruled out. Similarly, other overlapping conditions need to be considered and are addressed by virtue of the suggested approach to history and clinical assessment as outlined here. For those patients with a history of temporomandibular disorders, the following checklist can be used to ensure that the necessary information has been obtained and recorded.

Medical History
1. Past Medical History
2. Present and Ongoing Medical/Dental Diagnoses and Therapy
3. Past and Current Medications

Pain
1. Localized Facial/Jaw Pain
   - nature of pain, constant or episodic
   - site, radiation pattern
   - precipitating or aggravating factors
   - relieving factors, conditions, treatment

2. Earaches
   - bilateral or unilateral
   - association with other symptoms

3. Headaches
   - site
   - constant or episodic
   - relationship to other symptoms
   - duration and frequency
   - precipitating factor(s)
   - other related symptoms (i.e. photophobia, phonophobia, nausea etc.)
   - relationship to jaw or temporomandibular joint-related symptoms
   - relieving factors, conditions, treatment

4. Neck, Shoulder, Back, etc...
   - constant or episodic
   - relationship to other symptoms
   - precipitating factor(s)
   - relationship to jaw or temporomandibular joint-related symptoms
   - relieving factors, conditions, treatment

Limitation of Mandibular Movement
- constant or episodic
- precipitating and aggravating factors
- relieving factors, conditions, treatment

Joint Noises
- nature (i.e. clicking, popping, grinding etc.)
- side (left, right, both)
- constant, episodic
- association with jaw function

Altered Sensation
- site(s)
- nature (i.e. tingling, numbness, hyperaesthesia)
- constant or episodic
- precipitating factors
- relationship to other symptoms

Tinnitus
- bilateral or unilateral
- association with other symptoms

Perceived Hearing Loss
- bilateral or unilateral
- association with other symptoms

Related Cognitive Losses or Affective Disorders
- i.e. loss of energy, appetite, memory, concentration, feelings or appearance of depression/sadness

Sleep Disturbance
- difficulty falling asleep, staying asleep, nightmares

Related Emotional or Mood Changes

Duration of Each of the Symptoms

Relationship of Onset to Specific Events
(i.e. trauma, other injuries, stress, treatment, general anaesthesia etc.)

Parafunctional Habits
- night-time bruxism (sleep bruxism)
- clenching, nail-biting, chewing gum (daytime, nocturnal, frequency)
- onset

Previous Treatment for the Patient's Complaints and its Effectiveness

CLINICAL EXAMINATION

It is important to conduct a thorough clinical examination and to record all findings, in order to exclude other causes for the patient's symptoms and to determine the type of TMD and the extent of any disability related to the patient's symptoms. This information is critical to making a correct diagnosis and developing the appropriate treatment plan to address the needs of the particular patient. It is generally inappropriate for the general dentist's physical examination to extend beyond the head and neck region.

The following checklist is presented as an aid in the clinical examination process:

1. General Extra-Oral
- Patient's general appearance, demeanour, gait
- Facial swelling or significant asymmetry

2. Temporomandibular Apparatus
- Palpation of:
  - the temporomandibular joints both facially and via the external auditory meatus
  - the muscles of mastication and facial musculature both extra- and intra-orally

- Limitation of Mandibular Movement
  - inter-incisal opening (measured)
  - path of mandibular movement during opening or closing (i.e. deviation or deflection)
  - condylar movements
  - lateral movement of the mandible, symmetrical
  - protrusive movement of the mandible, symmetrical
  - presence or absence of pain on opening, protrusive or lateral movement of the mandible

- Joint Noise
  - audible or palpable
  - nature (i.e.. click, crepitus)
  - bilateral or unilateral
  - on opening, closing or both
  - early or late

3. Intra-Oral
- Dentition
  - missing teeth
  - state of repair of dentition
  - dentures, (full partial, adequate or inadequate)
  - presence or absence of dental or periodontal disease
  - wear facets
  - percussion sensitivity
  - thermal sensitivity where indicated

- Occlusion
  - note status of patient's occlusion and any changes such as open bite
  - whether occlusal relationships are functional or not (i.e. stable)

4. Other
   - trigger points for pain
   - altered sensitivity (e.g. pin-prick, light touch)
   - oral mucosal lesions or disorders

SPECIAL INVESTIGATION

The need for additional investigative procedures should be dictated by the results of the history and clinical examination. In many cases, minimal or no further investigation is indicated in order to initiate treatment. Should the patient be unresponsive to initial conservative therapy, additional investigation may then be indicated.

Radiographic Investigation

Radiographic investigation may be indicated if clinical evaluation and/or the medical or dental history suggest:

1. An abnormality of the osseous components of the jaws or joints,

   Investigations may include panoramic radiography (to rule out significant osseous or dental disease in the mandible or maxilla or severe condylar changes) or more detailed investigation using plain films, tomography, computerized tomography and/or nuclear bone scans (^{99m} technetium).

2. An internal derangement/disc displacement of the joints,

   The imaging modalities that assess positional, functional and morphologic abnormality of the articular disc are arthrography and magnetic resonance imaging (MRI). Arthrography is an invasive procedure that carries with it some morbidity and a risk of misdiagnosis, particularly of medial and lateral displacements and has been largely replaced by MRI. Although non-invasive, it is both expensive and difficult to obtain and requires considerable experience and skill in interpretation. Such studies should only be considered when the results would affect the course of treatment. Since disc displacements have been documented in asymptomatic individuals, imaging of the disc is only justified when the derangement is likely to be clinically significant or the patient has failed to respond to conservative treatment.

3. An extra-articular disorder.

   Radiographs of the dentition (for suspected dental disease) or other structures anatomically related to the temporo-mandibular joints, such as the salivary glands, sinuses, cranium or neck, may be indicated to rule out other craniofacial disease. Other imaging techniques might be indicated depending on the clinical diagnosis (e.g. ultrasound imaging for soft tissue lesions).

Consultation with a radiologist is often advisable when radiographic investigation not normally performed in a dental office is indicated. The radiologist can recommend the procedures with optimal safety and economy that would yield the most useful information.

Laboratory Investigation

- laboratory investigation is only necessary if previous investigation (history/physical examination) has suggested a metabolic or auto-immune disorder.

Other Consultations

- in selected cases, a consultation with other health care professionals (i.e.. family physician, neurologist, otolaryngologist, physiatrist, rheumatologist, psychologist, psychiatrist) may be indicated.

The clinical value of a number of diagnostic aids currently in use has not been demonstrated in well-controlled and scientifically based studies; these include jaw tracking devices, EMG recording and sonography (Doppler). These aids may have some use for research purposes but may not necessarily facilitate diagnosis or patient treatment.

DIAGNOSIS

Treatment must always be diagnosis based. The treatment should be directed at the factors apparently causing the symptoms and/or dysfunction. The mere presence of a disorder is not always justification for treatment as many are self-limiting and/or asymptomatic. Although there is no one uniformly accepted classification for TMD, diagnoses can include:

Masticatory Muscle Disorders

- myospasm, myofascial pain, myalgia NOS (not otherwise specified), pain as a component of systemic disorders such as fibromyalgia, chronic fatigue syndrome.

Internal Derangement/Disc Displacement

- with or without reduction, closed lock

Arthritides

- osteoarthritis, rheumatoid arthritis, psoriatic arthritis, septic arthritis, gout, pseudogout, lupus erythematosis, capsular inflammation

Congenital/Developmental Abnormalities

- condylar hyperplasia, condylar hypoplasia/aplasia, coronoid hyperplasia

The differential diagnosis, however, must also include the following:

Direct Traumatic Injuries, including:

- fractures of the condyle, condylar neck, coronoid process or temporal bone
- joint dislocation, subluxation or ligamentous /capsular disorders

Post-traumatic Disorders and Centrally Mediated Pain Syndromes (multifactorial and often refractory to treatment)

Neoplasms (of the components of the temporomandibular joints or related structures or metastatic)

Idiopathic Arthralgias, Dysfunctions

Other causes of facial pain not originating from the temporomandibular apparatus may need to be considered, including, but not limited to, the neuralgias (e.g. trigeminal neuralgia, atypical facial pain), demyelinating diseases, CNS tumours, vascular headaches, muscle contraction-type (tension-type) headaches, dentoalveolar disease, sinus disease, ear disease, salivary gland disease and psychogenic disorders.

The final diagnosis may, in some cases, be a combination of more than one of the above.

CONSERVATIVE MANAGEMENT

In most cases, initial treatment should be directed towards the relief of symptoms. There is no demonstrated value for the treatment of asymptomatic joint noises. The placebo effect of many therapeutic modalities has been well demonstrated and their use is considered acceptable on the assumption that they do not result in any irreversible changes or delay the use of a more effective treatment.

The concept of routine irreversible alteration of the patient's temporomandibular joints, jaws, occlusion or dentition is not supported by sound scientific studies. Such modalities of treatment can only be justified in selected cases where a non-functional occlusion (e.g. loss of posterior support, severe lack of adequate inter-arch dental contact) has been clearly and irrefutably demonstrated to be related to the aetiology, when conservative methods of treatment have failed and if the patient's signs and symptoms justify such an approach. It is important to recognize that failure to manage a patient's symptoms with a conservative method does not necessarily imply nor guarantee the success of another more invasive technique.

Where permanent alterations are an expected outcome, the patient must be fully informed and consent to the treatment. In general, most TMD's are actually managed rather than definitively treated and available modalities include:

Reassurance and Patient Education

Medication:

- analgesics,
- muscle relaxants,
- anti-inflammatory drugs, (NSAID's)
- tricyclic amines (antidepressants), (TCA's)
- anticonvulsants (gabapentin)

Some drugs may be contraindicated in selected cases (e.g. NSAID's in patients with gastrointestinal disorders, NSAID sensitive asthma, TCA's in patients with cardiac conduction disorders). The practitioner must be familiar with the potential drug interactions and side effects (long and short term use) of any medication prescribed and be prepared to deal with adverse reactions.

Physical therapy, directed therapy by a qualified physiotherapist

- jaw exercises (e.g. relaxation, rotation, stretching, isometrics and postural)
- application of superficial heat and/or cold
- massage
- manual mobilization
- ultrasound[+]
- low-intensity laser[+]
- pulsed diathermy[+]
- other non-invasive techniques such as iontophoresis, phonophoresis[+]

Psychological or psychiatric treatment by appropriately qualified practitioners (including behavioural modification therapy)

Stabilization type of occlusal appliances (i.e.. intraoral appliances designed to provide even and balanced occlusal contact without either forcefully altering the mandibular rest position or permanently altering the dental occlusion)

In specific circumstances, anterior repositioning appliances with subsequent "stepping back" (gradually returning the mandible to its previous anatomical position) or weaning the patient off their use is warranted (e.g. intermittent locking with limited range of motion or for TMJ arthralgia, not responsive to other forms of therapy, including a stabilization type appliance). They are only recommended for short-term, part-time use, primarily during sleep. Long-term, constant or permanent anterior repositioning of the mandible such as with orthodontics or fixed/removable prostho-dontics, is not validated by well controlled, well designed scientific research

Trigger point injections, where indicated, for the muscles of mastication

- local anaesthetics (without vasoconstrictor in muscles)
  Note: These may also be considered as part of the examination when used in a selective manner to aid in isolation of a possible source of pain and therefore might be administered into other anatomical sites (e.g. as a nerve block).
- corticosteroids
- botulinum toxin – There is some evidence that it is of value for myalgia, particularly that related to myospasm, muscle hyperactivity or severe bruxism when traditional methods fail.

If conservative treatment such as that previously described successfully reduces the patient's symptoms, restoration to function, of a non-functional (unstable) occlusion may be warranted. There is inadequate research demonstrating any value to occlusal adjustment or alteration, except where the patient's occlusion is non-functional.

Dental treatment may be indicated to correct previous restorative or prosthetic treatment that has resulted in an iatrogenic malocclusion. If conservative treatment is unsuccessful, invasive procedures to correct the malocclusion can be considered, but only if the patient's symptoms and dysfunction warrant it and only with the patient's consent, after the possible effects have been explained.

Treatment modalities that have not been validated scientifically should not be employed routinely. If such techniques are to be considered, the patient must be informed that there is no scientific support for their use and/or that they are experimental. Again, the patient must be advised of any possible adverse effects, including delay in appropriate treatment. In any case, these interventions should be non-invasive and not result in any irreversible changes.

[+] There is some evidence that some of these can reduce patient's symptoms facilitating mobilization and reducing pain thus allowing jaw exercises to proceed.

SURGICAL INTERVENTION

Surgical intervention may be indicated in selected situations. In all instances, it is expected that a diagnosis has been made and that this diagnosis is based on a thorough history, physical examination and the results of any necessary adjunctive diagnostic tests. A problem list should be generated and treatment goals identified.

Generally, all appropriate reversible treatment modalities should have been given an adequate trial before considering surgical intervention. It must be appreciated that where reversible, non-interventional therapy has failed to modify the patient's TMD (internal derangement), it does not necessarily follow that non-reversible, surgical intervention will result in a positive therapeutic effect. Furthermore, non-reversible, surgical intervention is generally part of a process of management rather than a cure, with some exceptions.

Where there is no obvious causal relationship between the patient's complaints and the anatomical or pathological abnormality, surgery cannot, with reasonable certainty, be expected to be helpful and, indeed, could be harmful. Similarly, if the patient presents with chronic pain, assessment and management of the psychosocial effects of the chronic pain disorder and an understanding of the effectiveness of chronic pain management strategies is appropriate prior to considering a surgical procedure. This may require the assistance of other health care professionals.

It is understood that pain or other dysfunctions of the temporomandibular joint and surrounding regions may be the result of disorders unrelated to joint disease. The surgeon must be satisfied that adequate consideration has been given to investigation sufficient to reasonably rule out other causes or factors.

Other health care providers may be consulted when signs and symptoms and/or the diagnosis warrant such consultation. These may, for example, include the patient's physician, a neurologist, an otolaryngologist, a rheuma-tologist, physiatrist or psychiatrist.

The patient is entitled to a full explanation of the diagnosis in "lay terms" as well as the proposed surgical intervention. In this regard, the explanation ought to include a discussion of treatment options, including no treatment. The proposed intervention should be described including the benefits and risks of the particular procedure. The patient must be informed that surgical intervention of any type, in and of itself, may have irreversible and negative consequences. Furthermore, there needs to be a clear understanding that the long-term success of such surgery may be unpredictable and that additional surgical intervention may also be required.

The patient must understand that signs and symptoms of a temporomandibular disorder might be the result of a combination of several problems. Accordingly, surgical management directed to one problem that might effectively control specific signs and symptoms, may not necessarily or predictably affect the remaining complaints.

Finally, the patient must understand that the postoperative management is an integral and important part of the overall treatment strategy. This may include physiotherapy, medical, psychological, dental, and pharmacological support. Post-operative management may continue for several years. Where the patient has a pre-existing chronic pain disorder, arrangements for ongoing pain management should be in place prior to surgical intervention. Generally speaking, while the surgeon will assist in pain management in the initial postoperative period, long-term pain management is best managed by the patient's physician or other health care providers.

There is no scientifically validated evidence in support of surgery to treat "simple" otherwise asymptomatic clicking as the only presenting symptom without associated locking or pain. Equally, there is little evidence in support of the suggestion that surgical and/or orthodontic correction of a malocclusion will predictably alter the course of an intra-articular disorder. It is understood, however, that patients with a significant TMD, a concurrent severe malocclusion (in particular an open bite deformity or a severe class II malocclusion with a deep overbite) and where the malocclusion may be a perpetuating or exacerbating factor in their disorder, might benefit by surgical and/or orthodontic correction of the malocclusion as

part of an overall management strategy*. Generally speaking, however, correction of a malocclusion is best considered on its own merits and should not be considered as the primary treatment with respect to management of a temporomandibular disorder.

The following surgical procedures are generally accepted by experienced temporomandibular joint surgeon* and by the American Society of Temporomandibular Joint Surgeons for patients with surgically manageable disorders such as internal derangements or osteoarthritis of the temporomandibular joint(s). The experienced surgeon skilled in temporomandibular joint surgery further enhances the validity and outcome of such procedures.

1. Arthrocentesis
2. Arthroscopy
3. Arthrotomy
4. Joint replacement (partial or complete) may be indicated in selected patients with joint destruction or ankylosis. This may include prosthetic devices or autogenous grafts
5. Coronoidotomy/Coronoidectomy
6. Condylotomy
7. Open reduction of chronic dislocation
8. Management of recurrent dislocation

In cases of severe pain with a diagnosis of Eagle's Syndrome, Styloidectomy may be warranted.

Long-term postoperative care is imperative to ensure optimal surgical outcome. Initially this includes wound care, application of heat/cold, dietary control, medication, and physiotherapy either professionally or self-administered focussing on mobilization amongst other desired functional outcomes.

* Reference is made to the experience of the Regional Treatment Centre for Reconstructive Surgery of the Temporomandibular Joint at Mount Sinai Hospital.

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