Guideline on Acquired Temporomandibular Disorders in Infants, Children, and Adolescents

Originating Committee
Clinical Affairs Committee – Temporomandibular Joint Problems in Children Subcommittee

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Purpose
The American Academy of Pediatric Dentistry (**AAPD**) recognizes that disorders of the temporomandibular joint (**TMJ**) occasionally occur in infants, children, and adolescents. This guideline is intended to assist the practitioner in the recognition and diagnosis of temporomandibular disorders (**TMD**) and to identify possible treatment options. It is beyond the scope of this document to recommend the use of specific treatment modalities.

Methods
This document is an update of the previous document, revised in 2006. The update included an electronic search using the following parameters: Terms: "temporomandibular disorder", "TMJ dysfunction", "TMD AND adolescents", "TMD AND gender differences", "TMD AND occlusion", TMD AND treatment"; Fields: all fields; Limits: within the last 15 years, humans, English, clinical trials. The reviewers agreed upon the inclusion of 69 references to support this guideline. When data did not appear sufficient or were inconclusive, recommendations were based upon expert and/or consensus opinion by experienced researchers and clinicians.

Background
Development of the TMJ
Function influences form as development and growth of the TMJ proceeds. The TMJ is comprised of 3 major components: the mandibular condyle, the mandibular fossa, and the associated connective tissue (including the articular disk).[1] The first evidence of development of the TMJ in humans is seen 8 weeks after conception.[2] During the first decade of life, the mandibular condyle becomes less vascularized and most of the major morphological changes are completed. During the second decade of life, there is continued but progressive slowing of growth. The shape of the mandibular condyle may change significantly during growth with approximately 5% of condyles undergoing radiographic changes in shape between 12 and 16 years of age.[3] From adolescence to adulthood, the condyle changes to a form that is greater in width than length. Although the TMJ experiences active growth in the first 2 decades, it undergoes adaptive remodeling changes throughout life.

Definition of TMD
Temporomandibular disorder is a term adopted by the American Dental Association in 1983 to facilitate coordination of research and communication.[4] While TMD has been defined as "functional disturbances of the masticatory system"[5], others include masticatory muscle disorders[6], degenerative and inflammatory TMJ disorders[7], and TMJ disk displacements[8] under the umbrella of TMD.

Certain medical conditions are reported to occasionally mimic TMD. Among them are trigeminal neuralgia, central nervous system lesions, odontogenic pain, sinus pain, otological pain, developmental abnormalities, neoplasias, parotid diseases, vascular diseases, myofascial pain, cervical muscle dysfunction, and Eagle's syndrome. Other common medical conditions (eg, otitis media, allergies, airway congestion, rheumatoid arthritis) can cause symptoms similar to TMD.[9]

Etiology of TMD
Temporomandibular disorders have multiple etiological factors.[10] Many studies show a poor correlation between any single etiological factor and resulting signs (findings identified by the dentist during the examination) and symptoms (findings reported by the child or parent).[10] In fact, the TMJ and masticatory system is complex and, thus, requires a thorough understanding of the anatomy and physiology of the structural, vascular, and neurological components in order to manage TMD. Alterations in any one or a combination of teeth, periodontal ligament, the TMJ, or the muscles of mastication eventually can lead to TMD.[11] Research is insufficient to predict reliably which patient will or will not develop TMD. Etiologic factors suggested as contributing to the development of TMD are:

1. Trauma: This would include impact injuries such as trauma to the chin. A common occurrence in childhood because of falling, chin trauma is reported to be a factor in the development of TMD in pediatric patients.[12-14] Unilateral and bilateral intracapsular or subcondylar fractures are the most common mandibular fractures in children.[15] Closed reduction and prolonged immobilization can result in ankylosis.[16,17]
2. Occlusal factors: There is a relatively low association of occlusal factors and the development of temporomandibular disorders.[18,19] However, several features characterize malocclusions associated with TMD:
   - skeletal anterior open bite;[20]
   - overjet greater than 6 to 7 mm;[20-23]
   - retrocuspal position (centric relation) to intercuspal position (centric occlusion) slides greater than 4 mm;[24]
   - unilateral lingual cross bite;[20-25]
   - 5 or more missing posterior teeth;[26,27]
   - Class III malocclusion.[28]
3. Parafunctional habits (eg, bruxism, clenching, hyperextension, other repetitive habitual behavior): Bruxism is thought to contribute to the development of TMD by joint overloading that leads to cartilage breakdown, synovial fluid alterations, and other changes within the joint. These parafunctional habits may occur while the patient is asleep or awake. A study of 854 patients younger than 17 years old found the prevalence of bruxism to be 38%.[29] The literature on the association between parafunction and TMD in pediatric patients is contradictory.[30-32] However, childhood parafunction was found to be a predictor of the same parafunction 20 years later.[33] Other studies found correlations between reported bruxism and TMD[34] with a 3.4 odds ratio.[35] Children who grind their teeth were found to complain more often of pain and muscle tenderness when eating.[36]
4. Posture: Craniocervical posture has been associated with occlusion and with dysfunction of the TMJ, including abnormalities of the mandibular fossa, condyle, ramus, and disc.[37-39]
5. Changes in "free-way" dimension of the rest position: Normally 2-4 mm, this may be impinged by occlusal changes, disease, muscle spasms, nervous tension, and/or restorative prosthetics.[11]
6. Orthodontic treatment: Current literature does not support that the development of TMD is caused by orthodontic treatment,[21,40-43] regardless of whether premolars were extracted prior to treatment.[44]

Prevalence of TMD in children and adolescents

The reported prevalence of TMD in infants, children, and adolescents varies widely in the literature.[44-47] Prevalence of signs and symptoms increases with age. One study of the primary dentition reported 34% of patients with signs and/or symptoms of TMD.[48] An epidemiological study of 4724 children aged 5-17 years reported 25% with symptoms. Clicking was seen in 2.7% of children in the primary dentition and 10.1% in late mixed dentition and further increased to 16.6% in patients with permanent dentition.[20] A similar study in preschool children found TMJ sounds and clicking in 16.6% of patients.[49] A study of 217 adolescents found that over 20% had signs and/or symptoms of dysfunction, with TMJ sounds and tenderness in the lateral pterygoid muscle as the most common findings.[50] Clicking is seen more frequently than either locking or luxation and affects girls more than boys. In general, the prevalence of signs and symptoms of TMD is lower in children compared to adults and is even less the younger the child but increases with increasing age.[25] Recent surveys have indicated a significantly higher prevalence of symptoms and greater need for treatment in girls than boys[45] with the development of symptomatic TMD correlated with the onset of puberty in girls.[51,52]

Controversy surrounds the significance of signs and symptoms in this age group, the value of certain diagnostic procedures, and what constitutes appropriate therapy. It is not clear whether these signs and symptoms constitute normal variation, preclinical features, or manifestations of a disease state. Whether these signs and symptoms warrant treatment as predictors of TMD in adulthood is questionable.[33]

Diagnosing TMD

All comprehensive dental examinations should include a screening evaluation of the TMJ and surrounding area.[53-55] Diagnosis of TMD is based upon a combination of historical information, clinical examination, and/or craniocervical and TMJ imaging.[56,57] The findings are classified as symptoms and signs.[53]

For a diagnosis of TMD, patients must have a history of facial pain combined with physical findings, supplemented by radiographic or imaging data when indicated.[58] A screening history, as part of the health history, may include questions such as:[59]

- Do you have difficulty opening your mouth?
- Do you hear noises within your jaw joint?
- Do you have pain in or around your ears or your cheeks?
- Do you have pain when chewing?
- Do you have pain when opening your mouth wide or when yawning?
- Has your "bite" felt uncomfortable or unusual?
- Does your jaw ever "lock" or "go out"?
- Have you ever had an injury to your jaw, head, or neck? If so, when? How was it treated?
- Have you previously been treated for a temporomandibular disorder? If so, when? How was it treated?

Clinical and physical assessment of the TMJ may include:[23]

- Manual palpation of the muscles and TMJ to evaluate for tenderness of intraoral and extraoral jaw muscles, neck muscles, and TMJ capsule;
- Evaluation of jaw movements including assessment of mandibular range of motion using a millimeter ruler (ie, maximum unassisted opening, maximum assisted

opening, maximum lateral excursion, maximum protrusive excursion) and mandibular opening pattern (ie, is it symmetrical?). Restricted mandibular opening with or without pain on mandibular movement may be interpreted as signs of TMJ internal derangement.[60]
- Determination of TMJ sounds by palpation and auscultation with a stethoscope;
- Radiographs (panoramic, full mouth periapicals, lateral cephalometric), TMJ tomography, and magnetic resonance imaging to examine for TMJ pathology and/or dental pathology. TMJ arthography is not recommended as a routine diagnostic procedure.[4,59]

As some mental disorders can greatly influence a patient's pain experience, psychosocial factors related to temporomandibular symptoms should be considered; this would include mood disorders, anxiety disorders, musculoskeletal problems, migraine headaches, tension headaches, emotional factors, ulcers, coliltis, occupational factors, and developmental/acquired craniofacial anomalies.[11]

There is a need for improved classification of TMDs; however, they largely can be grouped into 3 classes:

1. Disorders of the muscles of mastication (including protective muscle splinting, muscle spasm, and muscle inflammation);
2. Disorders of the TMJ (including internal disk derangement, disk displacement with reduction accompanied by clicking, and anterior disk displacement without reduction seen as mechanical restriction or closed lock); and
3. Disorders in other related areas that may mimic TMD (eg, chronic mandibular hypomobility, inflammatory joint disorders such as juvenile rheumatoid arthritis, degenerative joint disease, extrinsic trauma such as fracture).[4]

Treatment of TMD

Few studies document success or failure of specific treatment modalities for TMD in infants, children, and adolescents on a long-term basis. These suggest that simple, conservative, and reversible types of therapy are effective in reducing most TMD symptoms in children.[61] The focus of treatment should be to find a balance between active and passive treatment modalities. Active modalities include participation of the patient whereas passive modalities may include wearing a stabilization splint. The most common form of treatment of TMD in children was information combined with occlusal appliance therapy.[62] It has been shown that combined approaches are more successful in treating TMD than single treatment modalities.[62,63] Treatment of TMD can be divided into reversible and irreversible treatment.

Reversible therapies may include:

- Patient education (eg, relaxation training, developing behavior coping strategies, modifying inadequate perceptions about TMD, patient awareness of clenching and bruxing habits, if present).[59]
- Physical therapy [eg, jaw exercises or transcutaneous electrical nerve stimulation (TENS), ultrasound, iontophoresis, massage, thermotherapy, coolant therapy)].[5,64,65]
- Behavioral therapy (eg, avoiding excessive chewing of hard foods or gum, voluntary avoidance of stressors, habit reversal, decreasing stress, anxiety, and/or depression).[66]
- Prescription medication (eg, non-steroidal anti-inflammatory drugs, anxiolytic agents, muscle relaxers). While antidepressants have proved to be beneficial, they should be prescribed by a physician.[67]
- Occlusal splints. The goal of an occlusal appliance is to provide orthopedic stability to the TMJ. These alter the patient's occlusion temporarily and may be used to decrease parafunctional activity.[62,68,69]

Irreversible therapies can include:

- Occlusal adjustment (ie, permanently altering the occlusion or mandibular position by selective grinding or full mouth restorative dentistry);
- Mandibular repositioning [designed to alter the growth or permanently reposition the mandible (eg, headgear, functional appliances];
- Orthodontics.

Referral should be made to other health care providers, including those with expertise in TMD, oral surgery, or pain management, when the diagnostic and/or treatment needs are beyond the treating dentist's scope of practice.

Recommendations

Every comprehensive dental history and examination should include a TMJ history and assessment. The history should include questions concerning the presence of head and neck pain and mandibular dysfunction, previous orofacial trauma, and history of present illness with an account of current symptoms. In the presence of a positive history and/or signs and symptoms of TMD, additional information is suggested and a referral may be considered. A more comprehensive examination should be performed and include palpation of masticatory and associated muscles and the TMJ's, documentation of joint sounds, occlusal analysis, and assessment of range of mandibular movements including maximum opening, protrusion, and lateral excursions.

Joint imaging may be recommended by other specialists to investigate joint sounds in the absence of other TMD signs and symptoms. For example, the presence of crepitus may indicate degenerative change that is not yet painful.

Therapeutic modalities to prevent TMD in the pediatric population are yet to be supported by controlled studies. For children and adolescents with signs and symptoms of TMD, reversible therapies should be considered. Because of inadequate data regarding their usefulness, irreversible therapies should be avoided.[61,69] Referral to a medical specialist may be indicated when otitis media, allergies, abnormal posture, airway congestion, rheumatoid arthritis, or other medical conditions are suspected.[59]

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