Clinical Practice Guidelines for Orthodontics and Dentofacial Orthopedics

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Created: 1996
Amended: 2001, 2009, 2010, 2012, 2014, 2016, 2017, 2019, 2021

TABLE OF CONTENTS

Introduction

Orthodontics and Dentofacial Orthopedics is a specialty area of dentistry recognized by the National Commission on Recognition of Dental Specialties and Certifying Boards (NCRDSCB) concerned with the supervision, guidance and correction of the growing or mature dentofacial structures, including conditions requiring the movement of teeth or correction of malrelationships and malformations of their related structures. This includes any adjustments to the relationships between and among teeth and facial bones by the application of forces and/or the stimulation and redirection of functional forces within the craniofacial complex. Major responsibilities of orthodontic practice include the diagnosis, prevention, interception and treatment of all forms of malocclusion in addition to malrelationships or dysfunction of associated supporting structures. Additionally, orthodontists have specialized knowledge, skills, and experience that is beneficial in the interdisciplinary team management and care of patients who have been diagnosed with obstructive sleep apnea and other related breathing disorders. All measures to fulfill these responsibilities, including interdisciplinary referral when required, should strive to establish and maintain the best achievable outcome for healthy dental, occlusal, esthetic and physiologic functions.

A specialist in orthodontics and dentofacial orthopedics meets educational standards established by the Commission on Dental Accreditation and must possess advanced knowledge in biomedical, clinical, and basic sciences. This knowledge includes a comprehensive understanding of the biology of tooth movement, radiographic imaging and cephalometric measurements, orthodontic diagnosis, treatment planning, surgical orthodontics, biomechanical principles, the effects of growth and development on tooth movement, the application of orthopedic forces to dentofacial structures, and patient management and motivation.

The American Association of Orthodontists (AAO) is the leading national organization of dentists who limit their practice to orthodontics and dentofacial orthopedics and is recognized by the ADA as the sponsoring organization of the national certifying board, the American Board of Orthodontics. The membership of the AAO includes the vast majority of practicing orthodontists in the United States and Canada. The AAO has the background, expertise, and professional responsibility to assist the dental profession and the public by developing clinical practice guidelines for orthodontics and dentofacial orthopedics. The AAO recognizes its role in upholding the public trust granted to it in part by presenting these clinical practice guidelines to help practitioners develop judgments on diagnosis, treatment planning, and timing of orthodontic and dentofacial orthopedic therapy. The primary concern of the AAO is the provision of high-quality orthodontic care and the protection of the public. The AAO recommends that every child should have an orthodontic home by age 7 or sooner if certain developmental issues present. The child should be able to function appropriately in an orthodontic setting and have an established dental home to manage hygiene and dental caries.

Practice guidelines, as defined by the Institute of Medicine, are “systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances.”

The Orthodontic Clinical Practice Guidelines for Orthodontics and Dentofacial Orthopedics presented in this document are condition-based and are related to the International Classification of Diseases, Clinical Modification, 10th Edition (ICD 10 codes). This approach recognizes the need for integrated treatment of oral and dentofacial conditions rather than isolated treatment

procedures. These guidelines are also directed toward the process of patient care and outline considerations related to diagnosis, treatment, and quality of care.

These guidelines were derived from a professional consensus, based on a review of relevant clinical and scientific literature, the expert opinion of educators, and the clinical experience of practicing orthodontists. Similar documents written by other organizations and publications related to guideline development were also reviewed.

There are various professionally accepted philosophies regarding orthodontic diagnosis, treatment, and retention. The additional formal education of orthodontists makes them the best qualified practitioners for management of orthodontic issues. To simplify the language and enable consistent terminology throughout these guidelines, the term "dentist" will be used to encompass all licensed dental practitioners providing orthodontic care. Because of the nature of the doctor-patient relationship, the licensed dental practitioner (hereinafter referred to as “dentist”), who is actively engaged in treating the patient, is in the most informed position to evaluate and interpret the complexities, timing, and potential efficacy among the different philosophies and systems available. Deviations from these guidelines may be appropriate based on professional judgment and individual patient needs and preferences. Where a dentist chooses to deviate from these guidelines (based on patient specific circumstances or for any other reason) the dentist is advised to note in the patient's record the specific reason/reasons for following an alternative procedure. Finally, it should be understood that adherence to these guidelines does not guarantee a successful treatment outcome.

The AAO recognizes that these guidelines may be used by insurance carriers and other payers, attorneys in malpractice litigation, and various entities with an interest in orthodontics. The Association encourages all interested persons to become familiar with the Guidelines. This document was not developed to establish standards of care or to be used for reimbursement or litigation purposes. The AAO cautions that these uses involve considerations that are beyond the scope of the Guidelines.

The professional conduct of members of the AAO is governed by the Principles of Ethics and Code of Professional Conduct of the AAO and the ADA.

Evidence-Based Dentistry

Definition

The following outline of orthodontic diagnostic and treatment considerations are evidence-based recommendations. Evidence-based dentistry (EBD) is an approach to oral health care that requires the judicious integration of systematic assessments of clinically relevant scientific evidence relating to the patient’s oral and medical condition and history, with the dentist’s clinical expertise and the patient’s treatment needs and preferences.

Levels of Evidence

Rating systems exist to evaluate the strength of various study designs. The Centre for Evidence-based Medicine provides background information on this topic, as well as a commonly used table for the “Levels of Evidence.” In general, the levels of evidence, from strongest to weakest, are:

Meta-analysis
Systematic Review

Randomized Trial
Cohort Study
Case/Control Study
Case Series
Expert Opinion

Evidence-Based Practice

Evidence-based practice is assisted by critical evaluation of the body of literature on a specific topic. In particular, well-conducted systematic reviews and meta-analyses can provide guidance to assist dentists in clinical decision-making. Some resources for accessing evidence-based literature are:

1. AAO Evidence Based Orthodontic Research Website: A collection of systematic reviews, meta-analyses, practice guidelines, and summary statements on orthodontic topics.

2. The ADA Center for Evidence-based Dentistry: A website which houses information on evidence-based dentistry, as well as a listing of systematic reviews in dentistry. Additionally, this site provides links to other evidence-based resources.

3. PubMed: PubMed comprises more than 30 million citations for biomedical literature from MEDLINE, life science journals, and online books.

4. Cochrane Collaboration: An international nonprofit organization that develops evidence-based systematic reviews on health care interventions.

Orthodontic Treatment Definition

Orthodontic treatment is defined as a complex, professionally-guided, dynamic process that alters the dentofacial complex. Aspects of treatment require recurring clinical assessments in addition to in-person interactions with each patient by an appropriately licensed dentist.

Pretreatment Considerations

Prior to the initiation of orthodontic or dentofacial orthopedic treatment, in order to enhance the health and safety of the patient, an in-person comprehensive dental and orofacial examination should occur by a state-licensed dentist. That dentist shall be currently practicing, and have a dental license in good standing, in the same state in which the comprehensive dental exam takes place. That dentist shall be searchable in the same state-run database and be able to be contacted by the patient.

A screening examination may be performed to determine the nature of the orthodontic problem, and to determine if and when treatment is indicated. When treatment is indicated, it is recommended that a comprehensive examination be performed and include:

Examination

A. Chief Complaint
The chief complaint or the reason for seeking treatment as described by the patient, parent or legal guardian.

B. Medical and Dental History

An appropriate medical and dental history be obtained as a part of the initial evaluation of the patient. If treatment is to be delayed until a future date, an updated history may be necessary. Patients/parents/legal guardians should be requested to promptly advise the dentist of any change in the patient's health history.

C. Clinical Examination

A comprehensive clinical examination including the following, with all findings recorded in the patient's record:

1. An extraoral assessment to determine facial form, symmetry, soft-tissue harmony, and status of the perioral musculature. This determines deviations from normal regarding a patient's sagittal, vertical, and transverse maxillofacial relationships and to assess the relationship of the dentition to the facial structures.

2. An intraoral examination to assess the condition of the hard and soft tissues of the mouth (including the periodontium) and the static and functional status of the patient's occlusion.

3. An evaluation of the temporomandibular joint and associated musculature to assess function and disease.

4. An assessment of perceived or reported oral parafunctional habits.

Diagnostic Records

Diagnostic records, along with a comprehensive examination and history, form the foundation upon which a diagnosis and treatment plan with options are formulated.

Diagnostic records and tests will vary with the nature of the patient's condition but should be sufficient to identify the problematic clinical conditions present, formulate a diagnosis, and allow the development of an acceptable course of treatment with associated treatment goals. Where limited orthodontic procedures are anticipated, diagnostic records may vary from those associated with comprehensive care. Limited or comprehensive treatment encompasses all treatment techniques, including aligners or aligners in combination with fixed appliances and auxiliaries to significantly alter the alignment of teeth or occlusion and/or function.

Pretreatment unaltered diagnostic records for orthodontic treatment may include the following:

1. Extraoral and intraoral still photographic or video images (may include digital or film-based images) to supplement the clinical findings.

2. Plaster or digital dental models to assess the inter-arch and intra-arch relationship of the teeth, to help determine arch length and width requirements, to assess arch symmetry and to coordinate with other dental professionals concerning anticipated dental procedures.

3. Radiographic imaging (intraoral radiographs, panoramic radiographs, cephalometrics, CBCT, etc.) with interpretation to assess the condition and developmental status of the teeth, hard tissue supporting structures, to identify any

dental anomalies or pathology and make a screening assessment of the patient's upper airway.

Referral

Dentists may make a recommendation for referral of patients to general dentists, dental specialists, physicians, or other health care providers whenever, in the judgment of a dentist, referral would be in the best interest of a patient.

Diagnosis and Treatment Planning

An in-person diagnosis of the patient's oral health condition should be made by the dentist prior to the initiation of orthodontic treatment. Such a diagnosis allows for the development of an appropriate treatment plan that addresses the patient's chief complaint; medical and dental history; dental, skeletal, facial, functional, and/or psychosocial problems.

After a diagnosis has been established, a treatment plan should be developed. Such a plan will facilitate the coordination of the treatment objectives with the appropriate treatment modalities available for addressing the patient specific treatment objectives. A well-documented treatment plan should be based on the findings from the medical and dental history, clinical examination, diagnostic records, a critical evaluation of the patient's needs and preferences, and the dentist's professional judgment and preferences.

The detailed plan typically includes treatment objectives, appliance selection, sequencing and timing of treatment, coordination with other health care providers, and retention.

The treatment plan should be periodically reassessed by the dentist throughout treatment with progress records taken as deemed appropriate by the dentist. This reassessment should take into consideration various limiting factors and establish short- and/or long-term objectives.

Diagnostic and Treatment Considerations for Anomalies of Jaw Size, Relationship of Jaw to Cranial Base, Dental Arch Relationship and Dental Alveolus

The following conditions may indicate the need for orthodontic or dentofacial orthopedic treatment. These conditions may be structural, functional and/or esthetic in nature and may appear in various combinations and are not limited to the outline below. Frequently considered treatment options are listed for each condition. Adjunctive procedures to those listed used to supplement anchorage needs and improve treatment outcomes include but are not limited to: osseointegrated implants, mini-screw implants, miniplates and other temporary anchorage devices.

I. Maxillary/Dentoalveolar Hyperplasia (Large Maxilla)

A. Diagnostic Considerations

1. Anteroposterior
    a. Midface protrusion
    b. Dentoalvelolar protrusion
    c. Distoclusion
    d. Excess overjet
    e. Asymmetry

2. Vertical
    a. Increased lower anterior facial height
    b. Maxillary vertical excess
    c. Excessive gingival display
    d. Deep overbite
    e. Open bite
    f. Lip incompetency
    g. Asymmetry

3. Transverse
    a. Maxillary buccal crossbite (unilateral or bilateral; functional or structural)
    b. Occlusal plane cant
    c. Asymmetry

B. Treatment Options

1. Primary Dentition - Treatment indicated under certain circumstances, appliances vary

2. Transitional Dentition
    a. Functional/orthopedic appliances
    b. Fixed or removable orthodontic appliances
    c. Space maintenance

3. Adolescent Dentition
    a. Functional/orthopedic appliances
    b. Fixed or removable orthodontic appliances
    c. Fixed orthodontic appliances adjunctive to orthognathic surgery (surgery usually performed after majority of growth completed)

4. Adult Dentition
    a. Fixed or removable orthodontic appliances
    b. Fixed orthodontic appliances adjunctive to orthognathic surgery

II. Maxillary/Dentoalveolar Hypoplasia (Small Maxilla)

A. Diagnostic Considerations

1. Anteroposterior
    a. Midface deficiency
    b. Dentoalveolar deficiency
    c. Mesiocclusion
    d. Anterior crossbite (functional or structural)
    e. Asymmetry

2. Vertical
    a. Decreased lower anterior facial height
    b. Dentoalveolar deficiency
    c. Deep overbite
    d. Open bite

e. Lip redundancy
f. Asymmetry

3. Transverse
a. Posterior lingual crossbite (unilateral or bilateral; functional or structural)
b. Occlusal plane cant
c. Asymmetry
d. Transverse deficiency without posterior crossbite

B. Treatment Options

1. Primary Dentition
a. Functional/orthopedic appliance
b. Fixed or removable orthodontic appliance

2. Transitional Dentition
a. Functional/orthopedic appliance
b. Fixed or removable orthodontic appliance

3. Adolescent Dentition
a. Functional/orthopedic appliance
b. Fixed or removable orthodontic appliance

4. Adult Dentition
a. Fixed or removable orthodontic appliance
b. Fixed orthodontic appliance adjunctive to orthognathic surgery

III. Mandibular/Dentoalveolar Hyperplasia (Large Mandible)

A. Diagnostic Considerations

1. Anteroposterior
a. Prognathic facial pattern
b. Mesiocclusion
c. Anterior crossbite (functional or structural)
d. Macrogenia
e. Asymmetry

2. Vertical
a. Open bite
b. Deep overbite
c. Increased lower anterior facial height/steep mandibular plane angle
d. Asymmetry

3. Transverse
a. Posterior crossbite (unilateral or bilateral; functional or structural)
b. Asymmetry

B. Treatment Options

1. Primary Dentition - Treatment indicated under certain circumstances, appliances vary

2. Transitional Dentition
   a. Functional/orthopedic appliance
   b. Fixed or removable orthodontic appliance

3. Adolescent Dentition
   a. Functional/orthopedic appliance
   b. Fixed or removable orthodontic appliance

4. Adult Dentition
   a. Fixed or removable orthodontic appliance
   b. Fixed orthodontic appliance adjunctive to orthognathic surgery

IV. Mandibular/Dentoalveolar Hypoplasia (Small Mandible)

A. Diagnostic Considerations

1. Anteroposterior
   a. Mandibular retrognathic facial pattern
   b. Excess overjet
   c. Distoclusion
   d. Asymmetry

2. Vertical
   a. Open bite
   b. Deep overbite
   c. Decreased lower anterior facial height
   d. Increased lower anterior facial height

3. Transverse
   a. Posterior crossbite (unilateral or bilateral; functional or structural)
   b. Asymmetry

B. Treatment Options

1. Primary Dentition - Functional/orthopedic appliance

2. Transitional Dentition
   a. Functional/orthopedic appliance
   b. Fixed or removable orthodontic appliance

3. Adolescent Dentition
   a. Functional/orthopedic appliance
   b. Fixed or removable orthodontic appliance
   c. Fixed orthodontic appliance adjunctive to orthognathic surgery (surgery usually performed after majority of growth completed)

4. Adult Dentition
   a. Fixed or removable orthodontic appliance

b. Fixed orthodontic appliance adjunctive to orthognathic surgery
c. Functional/orthopedic appliances

Diagnostic and Treatment Considerations for Anomalies of Tooth Position, Discrepancies of Tooth Size, Arch Length, and Arch Form

These conditions may appear in various combinations and are not limited to the following. Frequently considered treatment options, which may include the removal of primary or permanent teeth, are listed for each condition. Adjunctive procedures to those listed include modification of tooth size, restorative replacement, surgical exposure, and appropriate soft tissue surgery.

I. Deficient Arch Length (Crowding)

A. Diagnostic Considerations
1. Labial/lingual displacement
2. Supra/infra eruption
3. Rotations
4. Impactions
5. Axial inclination of teeth (Anterior or Posterior)
6. Tooth size
7. Premature loss of primary teeth
8. Ankylosis
9. Supernumeraries/hypodontia/oligodontia
10. Soft tissue considerations
11. Complete/incomplete transpositions
12. Skeletal deficiencies
13. Age

B. Treatment Options

1. Primary Dentition
a. Fixed or removable space maintainer
b. Extraction of primary teeth

2. Transitional Dentition
a. Functional/orthopedic appliance
b. Fixed or removable orthodontic appliance
c. Serial extraction

3. Adolescent Dentition
a. Fixed or removable orthodontic appliance
b. Functional/orthopedic appliance
c. Extractions of permanent or remaining primary teeth
d. Exposure of impacted teeth for spontaneous eruption or orthodontic repositioning
e. Management of periodontal concerns

4. Adult Dentition
a. Fixed or removable orthodontic appliance
b. Extraction of permanent teeth

c. Exposure of impacted teeth for spontaneous eruption or orthodontic repositioning
d. Management of periodontal concerns

5. Interdisciplinary referral may be appropriate in each treatment option listed

II. Excessive Arch Length (Spacing)

A. Diagnostic Considerations

1. Skeletal arch size
2. Tooth size
3. Supernumeraries/hypodontia/oligodontia
4. Axial inclination of teeth
5. Facial/lingual displacement
6. Rotations
7. Fibrous gingival hyperplasia
8. Frenal attachments

B. Treatment Options

1. Primary Dentition
Treatment rarely indicated

2. Transitional Dentition
a. Fixed or removable orthodontic appliance
b. Management of periodontal concerns

3. Adolescent Dentition
a. Fixed or removable orthodontic appliance
b. Management of periodontal concerns

4. Adult Dentition
a. Fixed or removable orthodontic appliance
b. Management of periodontal concerns

5. Interdisciplinary referral may be appropriate in each treatment option listed

III. Discrepancies of Arch Form

A. Diagnostic Considerations

1. Asymmetry
2. Interarch coordination
3. Abnormal occlusal planes: Curves of Wilson, Spee or cants
4. Dual occlusal planes

B. Treatment Options

1. Primary Dentition - Fixed or removable orthodontic appliance

2. Mixed Dentition
    a. Fixed or removable orthodontic appliance
    b. Functional/orthopedic appliance

3. Adolescent Dentition
    a. Fixed or removable orthodontic appliance
    b. Functional/orthopedic appliance

4. Adult Dentition
    a. Fixed or removable orthodontic appliance
    b. Fixed orthodontic appliance adjunctive to orthognathic surgery

5. Interdisciplinary referral may be appropriate in each treatment option listed

Diagnostic and Treatment Considerations for Abnormalities of the Dentition (number, size, and shape), Vitality, Eruption Pattern, and Periodontal Support

Anomalies of tooth number, morphology or eruption pattern should be diagnosed and managed as soon as reasonably practical according to the particular requirements of each clinical situation. These conditions may appear in various combinations, and may indicate the need for orthodontic or dentofacial orthopedic treatment. Some of the frequently used treatment options listed below may also require an interdisciplinary approach.

A. Diagnostic Considerations

1. Supernumerary teeth
2. Missing teeth
    a. Congenital (anodontia)
    b. Pathologic
    c. Traumatic
    d. Extracted
3. Ectopic eruption of teeth
4. Impacted teeth
5. Eruption anomalies
6. Over-retained primary teeth
7. Ankylosed teeth
8. Transposition
9. Atypical crown morphology
10. Premature loss of primary teeth
11. Atypical root morphology
12. Root resorption
13. Carious or fractured teeth
14. Character of hard and soft tissue supporting structures
15. Tooth vitality

B. Treatment Options

1. Supernumerary teeth
    a. Surgical intervention
    b. Extraction
    c. Fixed or removable orthodontic appliance

d. No treatment

2. Missing Teeth
   a. Space maintenance/space regaining
   b. Prosthetic replacement of teeth/implants
   c. Transplantation
   d. Maintenance of primary teeth
   e. Space closure
   f. Fixed or removable orthodontic appliance

3. Ectopic Teeth
   a. Extraction
   b. Surgical intervention
   c. Fixed or removable orthodontic appliance

4. Impacted Teeth
   a. Surgical intervention
   b. Extraction
   c. Fixed or removable orthodontic appliance
   d. No treatment

5. Eruption Anomalies
   a. Surgical intervention
   b. Retention with or without coronal modification
   c. Extraction
   d. Fixed or removable orthodontic appliance
   e. Referral for medical evaluation

6. Over-retained Primary Teeth
   Extraction

7. Ankylosed Teeth
   a. Extraction
   b. Surgical luxation and/or repositioning
   c. Fixed or removable orthodontic appliance
   d. Retention with or without coronal modification

8. Transposition
   a. Extraction
   b. Retention with or without coronal modification
   c. Transplantation
   d. Fixed or removable orthodontic appliance

9. Atypical Tooth Morphology
   a. Retention with or without coronal modification
   b. Extraction
   c. Fixed or removable orthodontic appliance

10. Premature Loss of Primary Teeth
    a. Space maintenance
    b. Fixed or removable orthodontic appliance

11. Atypical Root Morphology
    a. Monitor radiographically
    b. Extraction

12. Root Resorption
    a. Monitor radiographically
    b. Extraction
    c. Stabilization
    d. Treatment alternative of initiating rest periods

13. Carious or Fractured Teeth
    a. Reposition tooth or root
    b. Monitor radiographically
    c. Extraction
    d. Fixed or removable orthodontic appliance

14. Periodontal Support
    Management of periodontal concerns

15. Interdisciplinary referral may be appropriate in each treatment option listed

Diagnostic and Treatment Considerations for Dentofacial Functional Abnormalities

Dentofacial functional abnormalities may occur in combination with other dentofacial conditions and should be diagnosed, managed, and when necessary, interdisciplinary care coordinated by the dentist according to the particular requirements of each clinical situation. Correction or control of functional problems may involve alteration of behavior patterns and may require orthodontic/dentofacial orthopedic treatment, and/or an interdisciplinary approach to treatment. The influence of functional abnormalities on dentofacial development is variable and multifactorial.

A. Diagnostic Considerations

1. Lip size and function

2. Tongue Size and Function
    a. Abnormal tongue function
    b. Ankyloglossia
    c. Microglossia or macroglossia

3. Deleterious Habits
    a. Thumb, finger or lip sucking
    b. Pacifier sucking
    c. Tongue thrust/sucking
    d. Clenching/bruxism
    e. Lip/cheek biting
    f. Nail biting
    g. Foreign objects (e.g., pipes, pens, pencils, musical instruments)
    h. Smoking and/or drug usage

4. Airway Obstruction
    a. Nasopharyngeal morphology

b. Sleep apnea
c. Allergies
d. Pathology

5. Speech Disorders

6. Mandibular Dysfunction
   a. Dental interferences
   b. Skeletal abnormalities
   c. Neuromuscular abnormalities
   d. Temporomandibular dysfunction

7. Trauma

8. Temporomandibular Disorders

Temporomandibular disorders represent a broad range of conditions which involve medical, dental, and psychological factors. Such disorders may be associated with stress, habits, emotional disorders, structural malrelationships, oro-facial pain, trauma to the face or head, occlusal disharmonies, and medical problems associated with osteoarthritis, rheumatoid arthritis, or viral disease. These factors may be associated with temporomandibular disorders in one individual with no symptomatology or pathology in another.

B. Treatment Options

1. Lip Size and Function
   a. Fixed or removable orthodontic appliance
   b. Therapeutic exercises/myofunctional therapy
   c. Functional/orthopedic appliance
   d. Surgery

2. Tongue Size and Function
   a. Fixed or removable orthodontic appliance
   b. Therapeutic exercises/myofunctional therapy
   c. Functional/orthopedic appliance
   d. Surgical reduction
   e. Lingual frenectomy

3. Deleterious Habits
   a. Behavior management
   b. Functional/orthopedic appliance
   c. Therapeutic exercises
   d. Fixed or removable orthodontic appliance

4. Airway Obstruction
   a. Referral for evaluation/treatment/surgery
   b. Functional/orthopedic appliance
   c. Orthognathic surgery

5. Speech Disorders
   a. Fixed or removable orthodontic appliance

b. Referral for evaluation/treatment/myofunctional therapy

6. Mandibular Dysfunction
   a. Occlusal equilibration (modification of tooth form)
   b. Fixed or removable orthodontic appliance
   c. Fixed orthodontic appliance adjunctive to surgery
   d. Functional/orthopedic appliance

7. Temporomandibular Disorders (TMD)
   TMD's are multifactorial in nature. Harmonious functional occlusion and muscular balance can enhance the health and stability of the temporomandibular joints. This alone may not relieve TMD symptoms, however. Numerous treatment modalities, including orthodontics, have produced beneficial results in the management of temporomandibular disorders. However, no singular treatment modality may necessarily be definitive for any particular patient. There is no reliable method for predicting or preventing future temporomandibular disorders in any particular individual. Often, treatment of such disorders is best approached from an interdisciplinary perspective.

Orthodontic Considerations for Craniofacial Anomalies, Cleft Lip and Palate

Management of patients with these and other anomalies is, in many cases, most effective when provided by an interdisciplinary team of dentists, physicians and other healthcare professionals. The optimal time for the first evaluation of these patients is within the first few days of life, and referral for team evaluation and management is appropriate at any age. Treatment plans should be developed and implemented on the basis of team recommendations. The orthodontist, as a member of the Craniofacial Team, should obtain pretreatment diagnostic records sufficient to identify the problems, formulate a diagnosis and assist in treatment planning. Orthodontic treatment should take into account those factors that may influence surgical and other applicable aspects required for optimal Craniofacial Team management of the patient.

For patients at risk for developing malocclusion or maxillomandibular discrepancy, similarly sufficient and obtainable diagnostic records should be collected at appropriate intervals. Depending on the goals to be accomplished, alternating periods of treatment and retention may be necessary beginning at birth. For example, patients with cleft lip and cleft palate may require presurgical maxillary orthopedics to improve the position of the maxillary alveolar segments prior to lip and palate closure. Later in life, timing of bone grafting of alveolar clefts to unify the clefted dentoalveolar segments should be determined by the stage of dental development and with collaboration between the orthodontist and surgeon in addition to other Team members.

Treatment Objectives and Limiting Factors

Treatment Objectives

The objectives of orthodontic treatment are optimum dentofacial function, health, stability and esthetics. While these objectives are desirable, it should be recognized that individual patients have specific problems, concerns and conditions which may prevent the attainment of optimal results in every case. Therefore, the inability to achieve some of the objectives of orthodontic treatment in a particular patient is not an indication of negligence by the dentist even when no limiting factors are reasonably evident or foreseeable.

There are situations where it is appropriate to plan the treatment to address the patient's limited objectives provided that such limited treatment is not detrimental to the patient. Any treatment plan that does not align with the optimal goals of orthodontic treatment should be acknowledged by the patient in an informed consent.

For example, a patient may present with a highly complex problem that will require lengthy and expensive treatment to fully resolve. The patient may prefer to resolve only specific aspects of the problem thereby reducing the scope of treatment to make it simpler, shorter, less expensive. In doing so the patient achieves some positive outcomes which satisfy the patient's objectives for seeking treatment.

Limiting Factors

Orthodontic treatment results may be affected by extenuating circumstances beyond the practitioner's control. These limiting factors should be documented in the patient's record when they are recognized and the patient/parent/guardian should be informed. The following are some although not all, potential limiting factors affecting orthodontic therapy:

1. Severity of the pretreatment condition
2. Mutual agreement to pursue limited treatment objectives
3. Abnormal skeletal morphology or growth, during or after treatment
4. Abnormal size, shape, or number of teeth
5. Aberrant tooth eruption patterns
6. Patient's failure to initiate timely treatment, continue or complete treatment
7. Compromised periodontal tissues
8. Persistent deleterious habits or abnormalities of muscle function relating to the dentofacial complex
9. Inability or unwillingness of the patient to cooperate with treatment (e.g., the wear and/or care of appliances, oral hygiene measures, diet, keeping appointments, etc.)
10. Failure to complete all recommended aspects of treatment
11. Poor quality, untimely or inappropriate integration of other recommended or required interdisciplinary dental and/or medical services
12. Disclosed or undisclosed medical complications or underlying systemic conditions
13. Transfer of patient care to or from another dentist during orthodontic treatment
14. Limitations of, or relapse following orthognathic surgical procedures
15. Patients failure to schedule and follow up with other specialists or their general dentist following a referral from their orthodontist for specific conditions stated in that referral

Treatment Consultation and Informed Consent

A discussion should be held with the patient/parents/legal guardian utilizing lay terminology to provide sufficient information for the responsible party to accept or reject the proposed treatment plan. The informed consent should be documented. Though requirements vary by jurisdiction, the dentist should consider including the following in the discussion:

1. A description of the diagnosis and treatment plan.
2. A discussion of reasonable alternative treatments.
3. The relevant risks, compromises, and limitations associated with the proposed treatment plan and reasonable alternative treatments.

4. A discussion of any portion of the treatment plan that will require the services of other dental or medical health care providers and the anticipated effects of such interdisciplinary services on the orthodontic treatment plan.
5. The prognosis related to treatment plan options, including the option of no treatment.
6. A discussion of the patient's responsibility relating to the care (e.g., maintaining periodic recall visits with their general dentist, compliance with adjunctive devices such as elastics, headgear, retainers, and other removable appliances, etc.).
7. An estimate of the duration of active treatment and retention.
8. The AAO also recommends that financial arrangements be considered at this time.

Risks Associated with Orthodontic Treatment

All forms of medical and dental treatment, including orthodontics, involve risks and/or limitations. Fortunately, in orthodontics, serious complications are infrequent. The dentist should discuss all reasonably anticipated risks with the patient in the exercise of sound professional judgment given the clinical condition of the patient. Due to the length of orthodontic treatment, conditions may arise which are coincident, but not caused by orthodontic treatment. Some of the risks associated with orthodontic treatment include but are not limited to:

1. Tooth decay, or permanent markings (decalcification).
2. The length of the roots of teeth may become shortened. In some cases root shortening may be pre-existing and should be documented in the pretreatment record.
3. The health of the bone and periodontal support of the teeth may be affected.
4. The teeth and/or jaws may have a tendency to change their positions after treatment.
5. Temporomandibular joint problems may appear concurrently with orthodontic treatment,but may be unrelated to the treatment.
6. The vitality of a tooth may be compromised.
7. Orthodontic appliances may irritate or damage the oral tissues and may cause injury if accidentally swallowed or aspirated.
8. Dental materials, instruments, and equipment may inadvertently result in damage or injury to the oral tissues, face and/or eyes.
9. Accidents unrelated to treatment or patient misuse of orthodontic appliances may result in injury to the oral tissues, face and/or eyes.
10. Oral surgery, orthognathic surgery or other adjunctive medical, surgical or dental procedures may be recommended and/or necessary in conjunction with orthodontic treatment. Associated treatments carry additional risks, limitations and additional informed consent issues which must be discussed with the patient/parents/legal guardian by the health care practitioner providing the service.
11. Orthodontic appliances may cause attrition, flaking or fracturing of tooth structure.
12. When orthodontic appliances are removed, fracture and/or damage to the teeth may result.
13. Medical or psychosocial conditions may result in compromised results or dissatisfaction with treatment.
14. Orthodontic materials may cause allergic reactions in some individuals.
15. Patients may be dissatisfied with their dental or facial esthetics at the conclusion of treatment due to unrealistic expectations or perceptions.
16. Abnormal growth during or after treatment may produce undesirable results or posttreatment changes.

17. Treatment time may be extended and results compromised due to unforeseen circumstances and/or poor patient cooperation.
18. Tooth movement during orthodontics may be adversely affected for patients receiving certain pharmaceuticals as they have the potential to slow tooth movement and may lengthen treatment time. The effects of these medications may be severe enough to stop tooth movement which may result in removal of appliances regardless of tooth positions. The effects of certain pharmaceuticals on an individual are not always predictable.
19. The use of orally applied drugs, especially certain drugs of abuse such as cocaine or amphetamines, may seriously compromise the periodontal tissue around teeth which can be exacerbated by orthodontic treatment.

Sterilization and Infection Control

Because of ever increasing numbers of infectious diseases in today's society, it is important for an orthodontic office to be aware of current Centers for Disease Control (CDC) guidelines for their recommendations for personal protective equipment and the management of staff and patients in the office to minimize the risk of transmission of such diseases.

1. The guidance for orthodontic procedures that do and do not produce high levels of aerosols can be found at the state, regional and national levels through organizations like state dental associations, regional dental boards, and national organizations such as the CDC and the AAO.
2. Orthodontists and their office team members are encouraged to become familiar with and implement guidelines issued by CDC as well as the state's Department of Health, ADA and other entities that have applications to dentistry.

Orthodontic Treatment

Orthodontic treatment is a complex, professionally guided dynamic process that alters the dentofacial complex. Regardless of the specific intervention, orthodontic treatment has a specific point at which it begins and ends. Between these two time points lie the bulk of orthodontic therapy. It is critical that the dentist manage the applied therapy using appropriate means consistent with orthodontic educational standards, ethical guidelines and legal requirements.

Due to the protracted nature of orthodontic therapy and since each patient will respond to treatment in a unique manner, orthodontic treatment requires supervision, dynamic reassessment, and case management to achieve the treatment goal.

Orthodontic Supervision

Supervision can be defined as monitoring the treatment progress and guiding the patient. Some aspects of supervision may be delegated to auxiliary personnel, depending on applicable laws. Certain aspects of treatment require face-to-face, in-office interaction with the patient to appropriately apply the chosen intervention.

Dynamic Reassessment

Dynamic reassessment occurs when the dentist monitoring treatment initiates a modification in the protocol or mechanics required for continued treatment progress. Therapeutic staging is an

intrinsic part of orthodontic treatment. Unforeseen or unanticipated provisional outcomes also require clinical judgment and experienced remediation. All of this is part of dynamic reassessment during which the dentist evaluates progress and applies essential modifications to achieve the desired treatment outcomes. Dynamic reassessment is fundamental to all forms of orthodontic treatment and requires the direct, professional judgment of a dentist. Referral for adjunctive dental or specialty treatment may at times be part of the process.

Posttreatment Evaluation and Outcomes Assessment

The effects of orthodontic treatment may be evaluated retrospectively with reference to the pretreatment condition. Consistent re-evaluation of treatment results along with continued review of treatment modalities and their effectiveness will serve to provide the public with the highest quality of orthodontic care. Assessments of the outcome of treatment are dependent in part upon the treatment goals and objectives, the condition being treated, the stage of the patient's dentofacial development, the treatment provided and the patient's compliance as well as tissue response to the therapy performed. Limiting factors should be considered when evaluating treatment outcomes.

Posttreatment Records

Posttreatment unaltered records provide information for the quantitative and qualitative assessment of treatment changes as well as for education, research, and quality assurance. Posttreatment records may include, but are not limited to:

1. Extraoral and intraoral images (digital, still or video images)
2. Dental casts (hard copy or digital format)
3. Radiographic imaging (intraoral radiographs, panoramic radiographs, cephalometrics, CBCT, etc.) to permit relative evaluation of the size, shape, and positions of the relevant hard and soft tissue craniofacial structures including the dentition.
4. Other indicated procedures or tests

Retention

1. A retention plan should be established after reviewing the patient's original condition, treatment objectives, the results achieved, and/or any limiting factors.
2. Successful completion of orthodontic treatment does not ensure the stability of the result. Future treatment may be recommended when posttreatment changes occur.
3. Posttreatment changes may be minimized with an indefinite retention wear protocol.
4. The explanation to the patient regarding his or her responsibilities for retaining the outcome of their orthodontic treatment should be clearly communicated and the patient should acknowledge their understanding of the information that has been provided to them.

Recordkeeping

The keeping and preserving of a patient's dental record is a part of providing high quality orthodontic treatment. Prudent recordkeeping is the foundation for planning and maintaining the continuity of patient care. It also provides documentary evidence of the evaluation and diagnosis of the patient's condition, the treatment plan, informed consent, the treatment provided, referrals

made, and follow up care. It also documents communications with the patient, other health care providers and any other third parties. The dental record also protects the legal interests of all parties. In addition, a patient's dental record may, as authorized by the patient or legal guardian or with appropriately redacted identifying information, provide material for continuing education, research, administrative oversight, billing, and quality assurance. When creating the patient's dental record, dentists should keep in mind the following:

1. Treatment procedures, changes in the treatment plan, patient compliance, treatment difficulties, and other important aspects of treatment should be recorded and maintained. Copies of related correspondence, informed consent and appropriate release forms should be maintained as part of the patient's record.
2. Documentation should be written, dictated, or computer annotated and maintained concurrently with treatment provided. This documentation should be dated and kept chronologically with any subsequent additions or changes conspicuously noted.
3. The original records are usually considered the property of the practitioner. Laws regarding patient record access, duplication and transfer vary from state to state. Dentists can obtain further clarification from their state regulatory agency.
4. Electronic/digital records have the potential to be altered. Alteration of original electronic/digital records must be avoided. Credible computer software either prevents this or records any alteration of an original electronic/digital record. However, enhancement of images is allowed as long as these are duly labeled and saved as separate images. Enhancement of other electronic/digital records, such as radiographs, to enable better identification of landmarks and/or dentoskeletal anomalies is permissible; however, the original cannot be altered. It is the responsibility of the dentist to protect the sanctity of all patient records as prescribed by all applicable local, state and federal laws.

Transfer of Orthodontic Patients During Active Treatment

Because of the time required to complete orthodontic treatment, the transfer of care from one dentist to another is a common occurrence.

Recommendations to the Transferring Dentist

1. Dentists should attempt to arrange for the continuation of orthodontic treatment of their patients with as little interruption as possible. Regardless of reason for transfer, reasonable efforts of both the transferring and accepting dentist are necessary to effect an orderly transfer. It is recommended, and in some states required, to obtain a written release from the patient/parents/legal guardian prior to the transfer of a copy of the patient's records. It is preferable to send copies of pertinent records directly to the new dentist. The use of electronic media may facilitate this process. It is acceptable, but less desirable, to provide these records to the patient/parents/legal guardian. A copy of patient records cannot be withheld due to an outstanding balance.
2. The transferring dentist should ensure that all appliances are in good order. The patient/parents/legal guardian should be advised that extended periods of active orthodontic treatment without supervision can be detrimental, and an appointment with the new dentist should be scheduled as soon as possible.
3. The patient/parents/legal guardian should be informed that there may be different approaches to treatment by different dentists.

4. The patient/parents/legal guardian should be informed that there may be different fees with treatment by different dentists.
5. The transferring dentist should make no statements that would undermine the establishment of a sound doctor-patient relationship with the accepting dentist.
6. The transferring dentist should be available for consultation with the accepting dentist.
7. The transferring dentist should provide appropriate financial information in advance or immediately upon request to the accepting dentist.

Recommendations to the Accepting Dentist

1. The accepting dentist should review the patient's records, including the previous financial arrangements, if available, prior to the development of a plan for continuation of treatment. In addition, the estimated time required to complete treatment and the financial arrangement for continuation of treatment should be discussed as soon as possible. Patients should be informed about their present oral health status without defamatory statements that are both untrue and damaging comments about the patient's prior treatment.
2. Appropriate records documenting the status of the patient at the time of transfer should be made.
3. A dentist is not obligated to accept an orthodontic transfer patient and may exercise discretion in selecting a patient into his/her practice, provided refusal to accept a patient is not because of the patient's race, creed, color, sex, national origin, disability, HIV seropositive status, or other legally recognized protected class. If a dentist is unable or unwilling to accept the transfer patient, the dentist may assist the patient/parents/legal guardian in finding another dentist.
4. At the patient/parents/legal guardian's request, a dentist may remove appliances from a patient not of record. It is advisable to consult with the previous dentist or dentists, if possible, prior to removal of appliances or cessation of treatment.

Dentists should be aware of the following documents written by the AAO Legal Counsel:

1. Second Opinions
2. Terminating the Doctor/Patient Relationship
3. Patient Records and Record Keeping

Appendix A

Historical Development

At its November 1993 meeting, the AAO Board of Trustees directed the AAO Council on Orthodontic Health Care (COHC) to study the feasibility of developing clinical practice guidelines for orthodontics. The council met in January 1994 and proposed a business plan for the development of Guidelines, which was considered at the February 1994 meeting of the AAO Board of Trustees. It was the consensus of the AAO Board of Trustees to develop guidelines utilizing the expertise within the AAO. A task force was appointed.

The task force met three times between July 1994 and January 1995 and wrote draft guidelines. A copy of draft guidelines was sent to all active AAO members in April 1995 for review. Open forums were held at the 1995 AAO Annual Session and at the meetings of all eight AAO constituent societies during August-November 1995. The task force met again in December 1995 to revise the draft guidelines based on feedback received in 1995. The December 1995 revised draft guidelines were widely circulated in January 1996 for comment. The task force reviewed the comments and a revised draft of the guidelines was distributed to the AAO House of Delegates members, the Board of Trustees and other leaders of organized orthodontics in April 1996. An open forum was held at the 1996 AAO Annual Session for comments on the revised draft guidelines. The revised draft guidelines were approved by the Board of Trustees, a House of Delegates Reference Committee and by the House of Delegates. The Clinical Practice Guidelines were printed in 1996 and were made available to AAO members.

Updating of Clinical Practice Guidelines

The American Association of Orthodontists considers its Clinical Practice Guidelines to be a living document. The existence of this document is intended to stimulate improvement in the practice of orthodontics by identifying areas where knowledge is incomplete or inadequate. The AAO recognizes the dynamic nature of orthodontics and dentofacial orthopedics and the necessity for updating the guidelines to reflect the evolving science and art of orthodontics. Revisions to the document, with opportunities for AAO member input, will occur periodically.

Appendix B

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