Clinical Guideline on Management of the Developing Dentition in Pediatric Dentistry

Originating Committee
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Background

Guidance of the eruption and development of the primary and permanent dentitions is an integral part of the specialty of pediatric dentistry. Such guidance should contribute to the development of a permanent dentition that is in a harmonious, functional, and esthetically acceptable occlusion. Pediatric dentists have the responsibility to recognize, differentiate, and either appropriately manage or refer abnormalities in the developing dentition as dictated by the complexity of the problem and the individual clinician's training, knowledge, and experience. Early diagnosis and successful treatment of developing malocclusions can have both short-term and long-term benefits while achieving the goal of occlusal harmony and function and dental facial esthetics.

The variables associated with the treatment of the developing dentition which will affect the degree to which treatment is successful include, but are not limited to:

1. chronological/mental/emotional age of the patient and the patient's ability to understand and cooperate in the treatment;
2. intensity, frequency, and duration of an oral habit;
3. parental support for the treatment;
4. compliance with clinician's instructions;
5. craniofacial configuration;
6. variations in craniofacial growth;
7. concomitant systemic disease or condition;
8. accuracy of diagnosis;
9. appropriateness of treatment.

Many unpredictable factors can affect the management of the developing dental arches and minimize the overall success of any treatment. These factors cannot always be controlled by the clinician. Appropriate pretreatment records should include those deemed necessary by the individual clinician to adequately diagnose the patient's condition.

Clinical examination should include:

1. intraoral examination to:
   a. assess overall oral health status;
   b. determine the functional status of the patient's occlusion.
2. facial analysis to:
   a. determine asymmetric growth patterns of the maxilla and mandible and/or lateral deviations of the mandible;
   b. determine disproportionate dental and skeletal vertical growth patterns;
   c. assess relative dental and skeletal anteroposterior (AP) contributions to the occlusal relationship.
3. functional analysis to:
   a. determine functional factors associated with the malocclusion;
   b. detect deleterious habits;
   c. detect temporomandibular joint dysfunction, which may require additional diagnostic procedures.

Diagnostic records may include:

1. extraoral and intraoral photographs to:
   a. supplement clinical findings with oriented facial and intraoral photographs;
   b. establish a database for documenting facial changes during treatment.
2. diagnostic dental casts to:
   a. assess the occlusal relationship;
   b. determine arch length requirements for intra-arch tooth size relationships;
   c. determine arch length requirements for interarch tooth size relationships;
   d. determine location and extent of arch asymmetry.
3. intraoral and panoramic radiographs to:
   a. establish dental age;
   b. assess eruption problems;
   c. estimate the size and presence of unerupted teeth;
   d. identify dental anomalies/pathology.
4. lateral and AP cephalograms and analysis to:
   a. produce a comprehensive cephalometric analysis of the relative dental and skeletal components in the anteroposterior, vertical, and transverse dimensions;
   b. establish a baseline growth record for longitudinal assessment of growth and displacement of the jaws.
5. differential diagnosis and diagnostic summary to:
   a. establish the relative contributions of the dental and skeletal structures to the patient's malocclusion;

b. prioritize problems in terms of relative severity;
c. detect favorable and unfavorable interactions that may result from treatment options for each problem area;
d. establish short-term and long-term objectives;
e. summarize the prognosis of treatment for achieving stability, function, and esthetics.

6. sequential treatment plan to:
   a. establish timing priorities for each phase of therapy;
   b. establish proper sequence of treatments to achieve short-term and long-term objectives;
   c. determine the results of treatment in progress and update the biomechanical protocol accordingly on a regular basis.
7. other diagnostic views (eg, magnetic resonance imaging and computed tomographic scans for hard and soft tissue imaging) may be obtained as indicated by history and clinical exam.

Management of oral habits[1,2]

Oral habits include, but may not be limited to, digit sucking, mentalis habits, lip wetting or sucking, posturing habits, abnormal swallowing, and oral self-mutilation.

The identification of an abnormal habit and the assessment of the particular habit and its immediate and long-term effect on the craniofacial complex and dentition should be made as early as possible. It is recognized, however, that this identification and assessment is often difficult due to the wide degree of expression of the habit and its deleterious effects. All treatment modalities must be appropriate for the child's development, comprehension, and ability to cooperate.

Treatment modalities may include the following: behavior modification (habit calendar, Band-Aid), fixed or removable appliance therapy, or referral to other dental or medical specialties (psychologists, myofunctional therapists).

Indications: Management of an oral habit is indicated whenever the habit is causing damage or there is a reasonable indication that the oral habit will result in unfavorable sequelae in the developing permanent dentition.

Objectives: Treatment should result in the decrease or elimination of the habit and its deleterious effects.

Space maintenance[3]

Whenever primary or permanent teeth are lost prematurely, deletrious changes in arch integrity can result. Migration of primary and/or permanent teeth can occur and the available space may be reduced by an amount sufficient to cause some degree of crowding in the permanent dentition.

Indications: The premature loss of primary molars may require the placement of a space maintainer to prevent the migration of adjacent teeth, depending upon the teeth present and the arch length. When loss of a primary canine occurs, the dental arch midline may be compromised and the arch length also may be reduced. The premature loss of primary canines may require the placement of a space-maintaining appliance to prevent midline deviation and/or loss of arch length, perimeter, and/or circumference.

The premature loss of primary incisors does not usually require the placement of a dental appliance for the maintenance of space because mesial movement of adjacent teeth is not generally expected. However, the replacement of primary anterior teeth for esthetics, or possibly to facilitate normal speech development, may be indicated.

Treatment modalities may include but are not necessarily limited to the following: fixed maintainers (band and loop, crown and loop, passive lingual arch, distal shoe, Nance appliance, transpalatal arch) and removable appliances (partial dentures with or without teeth, Hawley appliance).

The placement and retention of space-maintaining appliances require a high degree of compliant behavior on the part of the patient. Any appliance used should continue to function until the succedaneous teeth have assumed their normal position in the dental arch and should not prevent or interfere with such eruption.

Objectives: The goal of space maintenance is to prevent any loss of arch integrity, circumference, and length by maintaining the relative position of the existing dentition.

Diagnosis and prevention of crowding[4-7]

Crowding is a characteristic feature of a significant number of all classes of malocclusions. Lack of available space for the mandibular incisors is a common feature in the early mixed dentition. The amount of incisor crowding should not be expected to spontaneously improve after the complete eruption of the mandibular lateral incisors.

Crowding must be considered in the context of the patient's and parent's chief complaint and the total dental, skeletal, and soft tissue interrelationships.

Accordingly, assessment via comprehensive diagnostic records is suggested, with evaluation of such parameters as direction and pattern of growth, facial profile, facial width, muscle balance, tooth position, and study model analyses. The constellation of problems identified may require a comprehensive treatment plan and may include multiple phases of treatment. During treatment, ongoing diagnosis via progress evaluations should be recorded.

Indications: When diagnosis indicates existing crowding will not self-correct or become minimal with anticipated growth and development, intervention may be warranted. Appropriate treatment may be as simple as preservation of leeway space.

When incisor crowding is considerably greater than the available leeway space, arch expansion or extraction may be considered as a treatment option to prevent gross malalignment.

Objectives: Appropriate arch form should be obtained.

Long-term prognosis is based upon the success of the additional treatment provided, the retention requirements, and the compliance of the individual patient.

Space regaining[8,9]

Some of the more common causes of space loss within an arch are primary teeth with interproximal caries, ectopically erupting teeth, alteration in the sequence of eruption, ankylosis of a primary molar, dental impaction, transposition of teeth, loss of primary molars without proper space management, abnormal resorption of primary molar roots, premature and delayed eruption of permanent teeth, and abnormal dental morphology.

Space loss may occur unilaterally or bilaterally and may result from teeth tipping, rotating, extruding, being ankylosed, or translating. It also can occur as the result of extrusion of teeth and the deepening of the curve of Spee.

The degree to which space is affected varies according to the arch affected, the site in the arch, and the time elapsed since tooth loss. The quantity and incidence of space loss also are dependent upon which adjacent teeth are present in the dental arch and their status.

The amount of crowding or spacing in the dental arch will determine the degree to which space loss has a significant consequence.

Treatment may be accomplished with fixed or removable appliances. Treatment outcome is highly dependent upon patient cooperation, especially when removable space regaining appliances and/or extraoral/extradental force appliances are employed.

Indications: Loss of space in the dental arch interfering with the eruption of the permanent teeth into a desirable position may warrant space regaining intervention. Space loss and dentofacial skeletal development may dictate that space regaining not be indicated. The timing of clinical intervention subsequent to premature loss of a primary molar is critical.

Objectives: Space regaining treatment should result in increased arch length, perimeter and/or circumference, and/or improved eruptive position of permanent, succedaneous teeth. Space regained should be maintained until adjacent permanent teeth have erupted completely and/or until a subsequent comprehensive orthodontic treatment plan is initiated.

Anterior and posterior cross bites[10-13]

There are 3 types of cross bites: dental, skeletal, and functional.

Dental cross bites involve only the tipping of a tooth or teeth. The condition usually is localized and does not involve the basal bone. Teeth in dental cross bite usually are not aligned labiolingually or buccolingually in the alveolar process.

Skeletal cross bites involve disharmony of the craniofacial skeleton. Aberrations in bony growth may give rise to cross bites in 2 ways:

1. asymmetric growth of the maxilla and mandible;
2. lack of equal growth in length or width of the maxilla and mandible.

Such growth aberrations can be due to inherited growth patterns, trauma, or functional disturbances that alter normal growth.

Functional cross bites are due to a shifting of the mandible to achieve occlusion. These generally are caused by interferences which do not allow a posterior occlusion.

Indications: Cross bite should be considered in the context of the patient's total treatment needs. Anterior cross bite correction can reduce dental attrition, improve dental esthetics, limit alveolar warpage and improve the tooth-to-alveolus relationship, increase arch perimeter, and eliminate functional shifts. Posterior cross bite correction can accomplish the same objectives and can improve the eruptive position of the succedaneous teeth. Functional shifts should be eliminated as soon as possible to avoid asymmetrical growth. Treatment can be completed with selective tooth grinding, appliance therapy (fixed or removable), extractions, or a combination of these treatment modalities. Treatment decisions depend on the amount and type of movement (tipping vs bodily movement, rotation, or dental vs orthopedic movement); space available; anteroposterior, transverse, and vertical skeletal relationships; and growth status. Patients with cross bites and concomitant Class III skeletal patterns and/or skeletal asymmetry should receive comprehensive treatment.

Objectives: Treatment of a cross bite should result in improved intramaxillary alignment and an acceptable interarch occlusion.

Class II malocclusion[14,15]

Class II malocclusion (distocclusion) may be unilateral or bilateral and involves a distal relationship of the mandible to the maxilla. This relationship may be dental (the result of malposition of the teeth in the arches) or skeletal (the result of asymmetric or abnormal growth of the mandible and/or maxilla).

Indications: Treatment of Class II malocclusions is indicated to provide psychosocial benefits for the child patient by reducing or eliminating facial disfigurement, to lessen the risk of injury to permanent anterior teeth, and to reduce severity of malocclusion by promoting harmonious growth.

Objectives: Treatment of a developing Class II malocclusion should result in an improved over bite and overjet with appropriate intercuspation of the permanent dentition and an aesthetic appearance and profile compatible with the patient's skeletal base.

Class III malocclusion[16]

Class III malocclusion (mesocclusion) may be unilateral or bilateral and involves a mesial relationship of the mandible to the maxilla. This relationship may be dental (the result of malposition of the teeth in the arches) or skeletal (the result of asymmetric or abnormal growth of the mandible and/or maxilla).

Indications: Treatment of Class III malocclusions is indicated to provide psychosocial benefits for the child patient by reducing or eliminating facial disfigurement and to reduce the severity of malocclusion by promoting harmonious growth.

Objectives: Treatment of a developing Class III malocclusion should result in an improved over bite and overjet with appropriate intercuspation of the permanent dentition and an esthetic appearance and profile compatible with the patient's skeletal base.

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