Orthodontic treatment in the mixed dentition

“I’d like my daughter’s braces done now so we don’t have to deal with it at age 13.” Orthodontists, pediatric dentists, and general dentists have all heard this before. Orthodontic clinicians know, however, that most patients who receive orthodontic care in the mixed dentition will need a second phase of treatment in the permanent dentition. Whether to render treatment in the mixed dentition requires careful case selection and a thorough diagnosis and treatment plan.

The mixed dentition is the developmental period after the permanent first molars and incisors have erupted, and before the remaining deciduous teeth are lost. Phase I treatment is usually done early in this period. The American Association of Orthodontists recommends all children should see an orthodontist by age 7. A favorably developing occlusion at this age 13, boys age 15.

Phase II treatment will need a second phase of treatment. The molar relationship is usually end-on (slightly forward of Class I), and typically transforms into a Class I during the transition from the mixed to the permanent dentition.

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Jaw growth

Jaw growth affects orthodontic treatment, usually favorably, but sometimes unfavorably. When and how much growth will occur is completely unpredictable. However, we know some useful facts about jaw growth in the mixed dentition:

- The molar relationship is usually end-on (slightly forward of Class I), and typically transforms into a Class I during the transition from the mixed to the permanent dentition.
- Nicely aligned permanent incisors, with rather short clinical crowns, and a 1-3 mm overbite and overjet.
- There will often be a small space either mesial or distal to the primary canines.

Skeletal problems

Three common skeletal problems are the protrusive, retrusive, or very narrow maxilla. An interesting feature of dental development is the leeway space (extra space under the primary second molars). The primary second molars are often larger than the underlying second bicuspids. During the transition to the permanent dentition, this space is liberated. This may provide some extra space, however, in many patients it is lost as the permanent first molars drift forward to take up the slack.

The narrow maxilla is often associated with a posterior cross-bite (figure 1). You may see the mandible shift out of centric relation laterally toward the cross-bite side. This problem may cause enamel wear or stress on the TMJ and facilitate asymmetrical growth. The treatment is likely to involve expansion of the maxilla at the suture. Mandibular skeletal problems are complicated by the fact that the mandible has no sutures. Growth occurs at the condyle, and by surface apposition. We do not know how to make a short mandible grow significantly more. Researchers have studied functional appliances (activator, bionator, Frankel, Twin-block), and can demonstrate only 1-2 mm more mandibular growth than control groups. We do not know if such effects are permanent. We also don’t know how to make a long mandible grow less, or how to make an asymmetrical mandible straighten out. When such problems are severe, the clinician will often delay treatment until growth is complete, and consider surgical/orthodontic correction.

Since the mandible cannot be widened through sutural expansion,
our ability to create space is limited. There is no research to show that we can expand the mandibular dental arch more than 3-4 mm with permanent results. Therefore, treatment strategies for crowding in the mixed dentition focus on saving the leeway space under the deciduous second molars, mild expansion, or serial extraction of first bicuspids teeth (figure 2).

**Dental problems**

Many dental development problems can be headed off in the mixed dentition; for example, anterior crossbites (figure 3). In-time removal of a deciduous tooth could prevent a crossbite, but once the permanent upper incisor is caught on the lingual of the lower incisors, treatment is needed. The anterior crossbite can cause tissue damage around the affected lower incisor.

Another example is the displaced lower midline as a result of the early loss of a lower deciduous canine. Removal of the opposing canine may cause spontaneous correction of the midline. Delayed exfoliation can have a negative effect as well. The succedaneous tooth may become seriously displaced or impacted.

A panogram will reveal many aberrations of dental development, such as missing teeth, supernumerary teeth, impactions and displaced teeth.

Ankylosis of primary molars is a common finding in the mixed dentition. If the tooth is moderately submerged, leave it to exfoliate on schedule. A severe ankylosis can cause retardation of alveolar height or tipping of adjacent teeth.

Digital sucking habits are common in the mixed dentition. It is best to help the patient discontinue the habit around age 5 or 6. The use of a removable appliance may be effective (figure 4).

Another dental condition that deserves attention is TMD. Symptoms appear in some patients, and can be diagnosed and treated as with older patients.

**Anomalies**

Cranio-facial anomalies present some challenging skeletal discrepancies. Most patients with facial deformities (cleft palate, suture formation abnormalities) should be supervised by a cranio-facial panel of experts. These panels are typically associated with a children’s or university hospital and will include a psychologist, plastic surgeon, oral surgeon, orthodontist, speech therapist, etc.

**The late mixed dentition**

The transition period when the deciduous molars and canines are exfoliating is often called the late mixed dentition. This is the classic period to place a lower lingual arch to save extra space under the deciduous second molars. Some clinicians advocate starting comprehensive orthodontic treatment during this period. It gives you a head start on Class II correction in girls. Normalizing jaw relationship as the teeth erupt may guide them into better occlusion, thus simplifying the treatment. The downside of starting treatment at this age is extended treatment time. With some patients, the final eruption of the second molars may be a couple of years after the late mixed dentition.

**Controversy**

The two areas that remain controversial in the orthodontic literature are treatment of crowding and of Class II malocclusions in the mixed dentition. Is there a benefit to early treatment for these problems? This question has yet to be fully answered by research.

In the case of crowding, the clinician should at least supervise the development of the problem. Crowding can be disfiguring; a family may want early correction. It can lead to tissue recession, midline displacement, crossbite, or severe wear of incisal edges. The clinician may recommend early removal of deciduous teeth to delay the effects of the problem, or of permanent teeth to allow spontaneous improvements. If permanent teeth are removed early (as in serial extraction of first bicuspids), the dental alignment can improve dramatically. However, the timing of the extractions has a potent effect on the amount of spontaneous improvement, so the clinician must be familiar with the limits and indications of this maneuver. In almost every case, the serial extraction procedure is followed by comprehensive orthodontic treatment in the permanent dentition with fixed appliances.

Removal of permanent teeth is less controversial than expansion to provide room because research that supports expansion of the dental arch is lacking.

Early correction of the Class II maxillary protrusion can be valid in some cases. We know that very protrusive teeth increase the risk of traumatic injury. We can usually expect better cooperation with headgear appliances when the patient is in the preteen years. Gender is also an issue. Many girls’ facial growth is slowing down as the permanent teeth erupt. This limits the clinician’s ability to use growth as an ally to correct the problem. While most clinicians utilize the above principles in deciding whether or not to undertake a Phase I treatment, there remains conflicting evidence that treatment of mild-to-moderate Class II problems is worthwhile.

**Final thoughts**

The AAO recommendation to provide orthodontic screening or referral by age 7 is well-founded. The orthodontic clinician can diagnose and intercept certain developing problems with early treatment. Many other cases should be supervised, but not treated until the permanent teeth are in place. We must base our decision to treat on experience, knowledge of growth and dental development, and research.
References


