



Orthodontic Treatment in the Early Mixed Dentition: Is This the Optimum Time to Start Care?

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ABSTRACT

The age at which children should start orthodontic treatment has been debated amongst orthodontists for many decades. Orthodontists can agree on what is a quality orthodontic result, but disagree as to how and when to best obtain this result. Some orthodontists contend that starting treatment in the primary dentition is the most effective means of orthodontic care. Other orthodontists would prefer to begin in the early or late mixed dentition. Still others would rather postpone treatment until the permanent dentition at approximately age 12. This article will evaluate the pros and cons of initiating treatment at different ages.

Treatment in the primary dentition may be indicated for correction of a posterior and/or anterior cross-bite, class II or III malocclusions, premature loss of primary tooth, a cleft palate or crowding.¹ Primary dentition treatment could begin at age 4 to 5. This may be followed up with additional care in the early mixed dentition and more orthodontic treatment in the permanent dentition. The patient could potentially require three phases of orthodontic care from the ages of 4 to 15.

Another approach to early treatment is a two-phase approach. The first phase begins in the early mixed dentition at approximately age 8, and the second phase starts in the permanent dentition at approximately age 12. Some orthodontists maintain that early mixed dentition treatment with phase I orthodontic care can reduce or eliminate the need for full-banded phase II orthodontic treatment at a later age.² Others contend that phase I treatment cannot produce



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lasting treatment results and that the patient will require a second phase of comprehensive care, which increases the number of office visits.³

Orthodontic researchers have analyzed patients' compliance with early treatment and have shown different results. Some authors state that cooperation is better in the mixed dentition with younger patients than the older adolescent patients.² Others will argue that early orthodontic treatment prolongs orthodontic care and the patient will tend to "burn out" by the second phase of treatment.⁴

Orthodontic treatment could begin in the late mixed dentition, at approximately age 11, and treatment would then be limited to one phase of orthodontic care.⁵ This approach can be effective in correcting many malocclusions; however, occasionally initiating orthodontic treatment in the late mixed dentition phase can extend treatment time as much as four years while waiting for eruption of all permanent teeth. Patients can experience "burn out" with this potential prolonged treatment time.

Lastly, treatment could begin in the permanent dentition, which could shorten the treatment time and lessen the costs to the patient. The permanent dentition treatment would start upon eruption of the second molars, which may occur from the ages of 10 to 14. Initiating treatment at this stage could present a problem with the physically mature female patient who might complete her growth before eruption of the second molars. If full-banded orthodontic care is initiated with little or no growth remaining, correcting the class II malocclusion could become very difficult. There may be more need for extractions, surgical orthodontics, or compromised orthodontic treatment

CASE 1



Figure 1a. Phase I initial facial photo (age 7). Patient presents with complaint of an open bite due to thumb sucking habit.



Figure 1b. Phase I initial intraoral photo. Patient has a severe class II division 1 malocclusion with 8 mm overjet, -5 mm overbite, a narrow maxilla, and a severe class II skeletal pattern. She was treated with early (phase I) orthodontic treatment.



Figure 2a. Phase II (13 years old) initial facial photo. Start of the second phase of orthodontic care. Patient underwent phase I orthodontics for 18 months with fixed edgewise braces, a habit appliance and headgear. She wore a retainer after phase I orthodontics.



Figure 2b. Phase II initial intraoral photo shows closure of the open bite, expansion of the maxilla and reduction of the overjet.

when the patient has finished his or her facial growth. The mandibular leeway space will also be lost if treatment were to be postponed to the permanent dentition. Loss of the leeway space results in a loss of arch length of 2 to 6 millimeters. The patient may be more prone to need extractions of permanent teeth in a crowded case if the arch length decreases by loss of the leeway space.

In addition to the disputes regarding when the appropriate time is to start treatment, there is also disagreement within the profession on what types of problems should be treated at what age.

Some orthodontists would like to treat crowding problems in the mixed dentition, believing that in doing so results in a better opportunity to develop the arches and avoid extraction of premolars.⁶ Other orthodontists contend that development of the arches will lead to relapse at a later age and that expansion treatment will not be stable.⁷ Some orthodontists prefer to wait until the late mixed dentition to treat crowding problems before exfoliation of the second primary molars, in order that the leeway space can be used to resolve crowding.⁵ Others would prefer to treat

CASE 1



Figure 3a. Phase II final facial photo. Completion of the second phase of orthodontics with full-banded orthodontics for 14 months.



Figure 3b. Phase II final intraoral photo. Note full correction of the malocclusion with the second phase.



Figure 4a. Facial photo, six years retention. Photo shows normal facial growth and a nice profile.



Figure 4b. Intraoral photo, six years retention, shows the stability of the orthodontic result six years after the completion of orthodontic care.

a crowding problem in the permanent dentition with extraction of premolars rather than expand dental arches due to potential relapse of the expansion at a later age.

Orthodontic research has shown that simply holding leeway space in the mandibular arch during the mixed dentition can resolve crowding in about 75 percent of cases without extraction or expansion treatment. It has also been demonstrated that treatment with a lingual arch can resolve crowding in the mixed dentition and demonstrated good long-term stability.⁸

Recent research on correction of a class II in the early mixed dentition has found that perhaps class II treatment should be postponed until the permanent dentition rather than started in the mixed dentition.³ Researchers discovered that treatment changes that occurred in the first phase of orthodontic care relapsed by the start of second phase of orthodontic care. It was observed that patients who had two phases of orthodontic treatment did not have a significantly better outcome than patients who had one phase of orthodontic treatment in the permanent dentition.

Many orthodontists would prefer to correct a severe anterior open bite (Case 1), an anterior and posterior cross-bite (Case 2), class III maxillary deficiencies, and elimination of detrimental habits in the early mixed dentition rather than postpone treatment to the permanent dentition. Patients with severe flaring of the upper incisors should consider early treatment to help reduce the risk of trauma and fracture to the upper incisors. It is important that dentists identify at a patient's young age whether there are congenitally missing teeth, supernumerary teeth, or a dental midline shift. If the dentist does not recognize these problems until a later age, treatment will be more complicated and costly.

Early diagnosis of ectopic maxillary cuspids can often times prevent the impaction of a canine. The diagnosis can usually be made with radiographs; however, palpation of the buccal vestibule can also be effective in determining the position of the cuspid. Undiagnosed impacted canines can cause severe root resorption to the maxilla lateral incisors. More complicated orthodontic treatment may be avoided with early detection of ectopic cuspids.

At the Department of Orthodontics, University of Pacific Arthur A. Dugoni School of Dentistry, a comprehensive mixed dentition treatment approach is taught to the orthodontic graduate students. This approach teaches the students to closely evaluate the entire malocclusion of patients who are approximately 7 to 8 years old. After thorough review of diagnostic records, a treatment plan is established to address most or all of the problems present in the early mixed dentition. Treatment with the first phase is designed to correct all the

CASE 2



Figure 5a. Phase I initial facial photo (age 7). Patient presents with complaint of a cross-bite.



Figure 5b. Phase I initial intraoral frontal photo. She has a severe class II division 1 malocclusion with a bilateral cross-bite.



Figure 5c. Phase I initial intraoral side view photo. The patient presents a narrow maxilla and a severe class II skeletal pattern with 8 mm overjet. She was treated with early (phase I) orthodontic treatment.



Figure 6a. Phase II initial facial photo (age 11). Start of the second phase of orthodontic care. Patient underwent phase I orthodontics for 16 months with fixed edgewise braces, a maxillary expander, and headgear.



Figure 6b. Phase II initial intraoral frontal photo. Note the correction of the posterior cross-bite and reduction of the overjet and the good arch alignment.



Figure 6c. Phase II initial intraoral side view photo. The patient wore a retainer and a lower lingual arch after phase I orthodontic treatment, during the supervision phase. After review of these records, a second phase of treatment was not advised.



Figure 7a. Six years retention facial photo. Patient did not require a second phase of orthodontic care. Photos show the stability of the phase I orthodontic result six years after the completion of orthodontic care.



Figure 7b. Six years retention intraoral frontal photo. The patient had the bands removed after phase II evaluation and was given a set of removable retainers.



Figure 7c. Six years retention intraoral side view photo. Six years later she presented with the same nice arch alignment, a good class I, and ideal overjet and overbite.

problems. The goal is to eliminate or significantly reduce the need for phase II orthodontic care. This approach helps to produce a less complicated problem in the second phase, shortening the overall treatment time.

The objectives of early treatment could include establishing ideal overjet and overbite, aligning of the upper and lower incisors, establishing ideal torque, tip of the upper and lower incisors, adequate arch length, and obtaining a class I molar position. Treatment typically uses fixed orthodontic appliances, including bands on the maxillary first molars and brackets on the upper incisors. Headgear would be used for correction of most class II malocclusions. A facemask would be used to protract the maxilla forward in a class III skeletal pattern. The mandibular arch is usually treated with a lingual arch that is removable and adjustable. If crowding is present in the maxillary and/or mandibular arch, the first primary molars or primary cuspids are extracted to gain room for alignment of the incisors. The mandibular lingual arch is adjusted at each visit until alignment of the incisors is obtained. In order to determine the extent of mandibular crowding in the mixed dentition, the Hixon-Oldfather analysis is performed on the mandibular arch before placement of a lingual arch to obtain an accurate measurement of mandibular crowding.

At the conclusion of the first phase of orthodontic treatment, the patient will enter a supervision stage until the eruption of permanent teeth. During this supervision stage the patient wears a removable retainer and continues use of the lingual arch to maintain the alignment of the lower incisors. Occasionally,

headgear is worn during the supervision stage to continue correction of class II molar position or to prevent rebound toward a class II problem.

For patients with a severe arch length deficiency, a serial extraction approach would be initiated in the early mixed dentition. Rather than attempt significant expansion of the dental arches, which would likely be unstable, the

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patient undergoes removal of primary cuspids and primary molars. This would be followed by extraction of premolars in late mixed dentition and then comprehensive full-banded orthodontic treatment in the permanent dentition.

The University of the Pacific's orthodontic department has conducted a research project with early orthodontic treatment.⁹ The study involved patients who received an initial phase of treatment between the ages of 8 to 10. Patients were treated with a maxillary 2-by-4 appliance consisting of upper incisor brackets and upper first molar bands. Class II patients received headgear. Patients with lower incisor crowd-

ing had a lower lingual arch and, occasionally, extraction of the lower first primary molars when there was incisor crowding present. Treatment time for the first phase was approximately 12 to 18 months. The data indicated 42 percent of the patients who received early treatment did not require phase II full-banded orthodontic treatment as determined by the treating orthodontist. Patients who received only phase I early treatment had fewer visits, shorter treatment times, and significantly lower orthodontic fees than those who required full-banded orthodontic treatment. Patients requiring only phase I orthodontic treatment and no phase II treatment had less extensive treatment than patients in either the full-banded orthodontic treatment group or the two-phase orthodontic treatment group.

Further analysis of the data indicated that intermolar and intercanine arch width (maxillary and mandibular) increased during phase I and remained stable at the second-phase evaluation stage, at approximately age 12. There was significant improvement in the position of the maxilla and mandible, reduction of the overjet, and reduction of the molar position severity from class II to class I. There was a significant increase in width of the maxillary cuspids with an average of 4.2 millimeters. With early treatment subjects who required a second phase of treatment, all skeletal and dental changes observed at phase II evaluation were maintained and improved through the second phase of treatment. Eighty-two percent of early treatment cases did not require extractions of permanent teeth in the permanent dentition, substantially lower than compared to a rate of extrac-

tion of 25 percent in the low extraction rate practices and 85 percent in the high extraction rate practices.¹⁰ According to the findings of the authors' study, early mixed dentition orthodontic treatment appears to be an acceptable treatment strategy for correcting problems and holding the result both skeletally and dentally. The changes remained stable at the phase II evaluation records and at the end of the second phase. The investigators believe that the key to successful early treatment includes thorough and accurate diagnosis, comprehensive treatment planning, and continued care during supervision until the eruption of the permanent dentition.

The best timing of orthodontic treatment is a decision made by the orthodontist, the parent, and the patient based on all the factors that impact success. All options should be reviewed with the parent in order that he or she may make an informed decision.

The American Association of Orthodontists, www.braces.org, recommends that all children get a check up with an orthodontist no later than age 7. An early exam allows the orthodontist to offer advice and guidance as to when the optimal time to start treatment would be for that specific patient. ■■■■

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