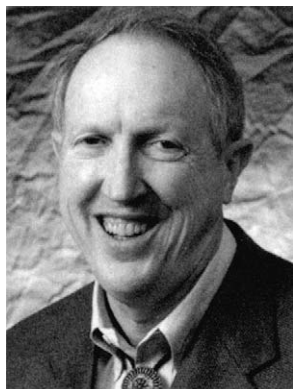


# The timing of early treatment: An overview

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**I**n determining the optimal timing for orthodontic treatment, 2 considerations are important: effectiveness (how well does it work?) and efficiency (what is the cost-benefit ratio, with cost in its broader sense of the burden of treatment?). The timing of treatment can affect both important issues. Both must be kept

in mind when deciding when to treat various orthodontic problems, and both are an important background for the application of some principles of treatment timing. These principles are:

- Growth modification often is desirable. Ample evidence now shows that growth modification is most successful when it accompanies the adolescent growth spurt and ends about the time rapid growth subsides. Otherwise, the original growth pattern will lead to a loss of the correction. The bottom line: if you start growth modification too late, it doesn't work; if you start it too soon, it takes too long.
- Facial growth in the 3 planes of space declines to adult levels at different times. Therefore, it makes sense to time growth modification procedures differently for different problems. This is the focus of the discussion below.
- Tooth eruption correlates, but not very well, with the stage of skeletal growth. The timing of treatment often must be adjusted because skeletal and dental development are not in synchrony.
- Permanent teeth often do not erupt where their deciduous predecessors were. This means that a second stage of treatment in the early permanent

dentition is usually necessary when the initial treatment was done in the mixed dentition.

Based on these principles, the gold standard for orthodontic treatment timing is during the adolescent growth spurt, starting in the late mixed or early permanent dentition. At that time, some growth (especially vertical growth) remains available to assist treatment, permanent teeth are available for final positioning, treatment usually ends as the adolescent growth spurt ends, and the shorter treatment time lowers the burden of treatment.

The question for a conference on treatment timing, therefore, is when would it be advantageous to treat before or after the gold standard time? The answer, of course, is only when treatment at a different time would be either more effective or more efficient. The primary indication for delaying treatment beyond the adolescent growth spurt is prolonged growth in an unfavorable pattern. That happens in 2 circumstances: Class III problems due to mandibular prognathism and recurrent anterior open bite because of deficient ramus growth relative to posterior tooth eruption. Prognathic patients have more mandibular growth than normal, primarily because they continue to grow into their late teens or early twenties. For these patients, both orthodontic camouflage and surgical correction are more effective and more efficient if treatment is delayed until the excessive mandibular growth is finally ending. Patients with recurrent anterior open bite tend to relapse after treatment that is done before their vertical growth is completed, so they are more efficiently treated in their late teens.

When would early (preadolescent) treatment be indicated? Two-stage treatment is more costly, in both dollars and burden of treatment, than 1 stage. The indications for an early first stage of treatment, therefore, are that it will produce a long-term result that is enough better to justify the extra cost, or that it will eliminate the need for a later stage of treatment. Given the principle that, after early treatment, permanent teeth tend to erupt in unfortunate positions that require correction, the primary indication must be a better result. Let's consider early treatment for the 3 major classes of malocclusion from that perspective.

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### Early treatment for Class I problems

There is a clinical consensus that early correction is indicated for a posterior crossbite with a mandibular shift. There is no doubt that this is effective, and, since it might be easier to correct such a crossbite earlier rather than later, it also appears to pass the test of efficiency, but little long-term data are available to document this.

On the other hand, there is much controversy about the best way to treat Class I crowding. Data show that, in moderate crowding, starting treatment just at the end of the mixed dentition and maintaining leeway space facilitates nonextraction treatment.<sup>1</sup> That, of course, is the gold standard treatment time. For a patient with crowding in the early mixed dentition, there are 3 possibilities: (1) wait until the second deciduous molars are ready to exfoliate, intervening only if there is early loss of the deciduous canines; (2) proceed with serial extraction; or (3) expand the arches at that time. All these approaches are effective; the question is not whether they work, but whether they produce a better result that justifies the greater duration, expense, and burden of treatment.

Serial extraction is used much less now than a generation ago, because it is hard to be absolutely certain that crowding in the early mixed dentition is severe enough to make the extraction decision at that time. In extremely severe crowding, however, data show that serial extraction can reduce the length of later comprehensive treatment,<sup>2</sup> so it can be efficient in carefully selected patients.

Early expansion, typically with opening of the midpalatal suture, currently is a popular approach to crowding problems. It works, but a second stage of comprehensive fixed appliance treatment almost always is necessary. Is the long-term result enough better to be worth the longer treatment time that includes retention between the first and second stages of treatment? There are still no good data on this important point. Early expansion, therefore, must be rated as reasonably effective but questionably efficient. Comparative data for 2-stage versus later 1-stage treatment of these problems are urgently needed.

### Early treatment for Class III problems

For patients with Class III malocclusions, the timing of treatment depends on distinguishing between mandibular prognathism and maxillary deficiency. Efforts to restrain mandibular growth at an early stage rarely succeed, because later mandibular growth wipes out any early correction. On the other hand, data (see the article by Ngan in this issue) show that facemask

treatment to modify growth in maxillary deficient children succeeds if, and only if, the treatment is done quite early.

What determines the success of early facemask treatment? Mandibular growth at and after adolescence. This means that patients must be followed for 10 years or so before the effectiveness of this treatment can be judged. Most facemask patients significantly improve in the short term, but current data suggest that about 25% eventually require orthognathic surgery anyway. Better selection of patients for facemask treatment should improve both the effectiveness and efficiency of this method.<sup>3</sup>

### Early treatment for Class II problems

The ideal way to compare 1 treatment approach with another is a randomized clinical trial. Although not all questions for treatment timing can be answered in this way, 3 major clinical trials of early 2-stage versus later 1-stage Class II treatment have been completed (at the universities of North Carolina, Florida, and Manchester). The results, described in detail in the articles by Wheeler and O'Brien in this issue, are remarkably consistent and provide a clear answer: both headgear and functional appliances are effective in modifying growth during a stage of early treatment, so that at the end of the first stage, there is a statistically significant difference between the treated children and their untreated controls. At the end of comprehensive fixed appliance treatment for all the subjects, however, the University of North Carolina data<sup>4</sup> show that there is no difference among the previously treated and untreated groups in:

- Peer assessment rating scores for dental occlusion
- Jaw relationships (the previously untreated children had more growth during the second stage than the previously treated ones)
- The number of children who required premolar extraction during comprehensive treatment
- The number of children judged to need orthognathic surgery
- The length of the second stage of treatment

The results were the same for the Florida and Manchester trials, and a body of data from retrospective studies supports the same conclusion. It now has been established that early treatment for most Class II children is no more effective, and considerably less efficient, than later 1-stage treatment during adolescence. Yet the timing of Class II treatment remains controversial. Why?

Orthodontists are not unique in being reluctant to accept new information that contradicts their preferred

methods of treatment. In medicine, recent clinical trials have overturned many strongly supported treatment methods, most recently hormone supplements for menopausal women and COX-2 inhibitors for arthritis pain. Many physicians believe that these treatments are needed for some of their patients and will continue to use them, but it is likely that their usage will decline over time. A recent report by a committee of the National Academy of Sciences offered the pessimistic conclusion that "It takes an average of 17 years for a new medical discovery to be incorporated into routine medical practice."

Most orthodontists now understand that the Class II clinical trial results do not mean **early Class II treatment** is never indicated. We need acceptance of the general guideline that this treatment **is not of value for most children**, and a focus on determining when and why early treatment is indicated. Attacks on well-controlled research as inappropriate for orthodontics and distortion of the data to support a strongly held idea are

unprofessional at best and damaging to the quality of patient care at worst. The truth might be awkward to accept at times, but it remains the best guide for excellent clinical practice.

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