

## CHAPTER 1

# A guide for timing orthodontic treatment

Eustáquio Araújo, DDS, MDS<sup>1</sup> and Bernardo Q. Souki, DDS, MSD, PhD,<sup>2</sup>

<sup>1</sup>Center for Advanced Dental Education, Saint Louis University, St. Louis, MO, USA

<sup>2</sup>Pontifical Catholic University of Minas Gerais, Belo Horizonte, Brazil

When the decision was made to work on this book, the heavy responsibility of embracing the topic without bias or radicalism increased. Clinicians and academicians were initially consulted and asked to provide questions that would help to establish priorities for early interventions. The responses came rapidly and contained all the sorts of questions one would imagine. *Recognizing and Correcting Developing Malocclusions* will try to address the collected questions and themes.

The term “early treatment” has been used for a long time, and it seems now to be fixed. Although “early” could suggest “too soon,” for the sake of practicality it will be used in this book. The text will eventually also refer to timely or interceptive treatment.

Initiating orthodontic treatment during the growth spurt was often used to be considered as the “gold standard” for treatment timing. The pendulum that regulates the initiation of orthodontic treatment has been swinging in different directions for many years. At present, this balance seems to have been shifting, as the pendulum appears to be swinging toward an earlier start, preferably at the late mixed dentition. The possibility of successfully managing the E-space has dramatically influenced the decision-making on the timing of orthodontic treatment [1].

At the beginning of the 20th century, some consideration was given to early treatment. A quote from Lischer [2] in 1912 says,

Recent experiences of many practitioners have led us to a keener appreciation of the “golden age of treatment” by which we mean that time in an individual’s life when a change from the temporary to the permanent dentition takes place. This covers the period from the sixth to the fourteenth year.

Soon after, in 1921, a publication [3] titled “The diagnosis of malocclusion with reference to early treatment,” discusses concepts of function and form, and gives notable consideration to the role of heredity in diagnosis – so the topic with its controversies is an old one.

“The emancipation of dentofacial orthopedics,” an editorial by Hamilton [4] supports early treatment. In summary, he states that:

- a healthcare professionals must do everything possible to help their patients, including early treatment;
- b it is irresponsible and unethical to prescribe treatment for financial betterment and for the sake of efficiency;
- c if the orthodontist is not willing to treat patients at a young age, others in the dental profession will, and it is in the patients’ best interest that we, as specialists, treat these patients. After all, our flagship journal includes “Dentofacial Orthopedics” in its title;
- d it is the highest calling of healthcare professionals to incorporate prevention as a primary means of treatment, and therefore early treatment is important;
- e pediatric dentists and other health professionals are incorporating early treatment in their practice because orthodontists are waiting too long to initiate treatment;
- f orthodontic programs have the responsibility to educate orthodontists about early treatment.

On the other hand, Johnston [5] indicates in “Answers in search of questioners” that:

- a little evidence exists that two-phase early treatment has a significantly greater overall treatment effect compared with treating in one phase and considering E-space preservation;
- b treatment aimed at the mandible typically has an effect on the maxilla;

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- c early treatment is not efficient for the patient or doctor and results in an increased burden of treatment;
- d functional appliances do not eliminate the need for premolar extraction, as bone cannot grow interstitially and arch perimeter is not gained with their use;
- e patients occasionally endure psychological trauma due to dental deformity, but these isolated instances are not enough to “support what amounts to an orthodontic growth industry.”

In an effort to establish grounds to initiate treatment earlier or later we must try to answer two key questions:

- 1 Should developing problems be intercepted and treated in two phases?
- 2 Which malocclusions should receive consideration for treatment at an early age?

Undoubtedly, there is much agreement on what to treat, but there is still great disagreement on when to intervene.

What are achievable objectives for early treatment? Some of the most relevant ones are using growth potential appropriately, taking advantage of the transitional dentition, improving skeletal imbalances, eliminating functional deviations, managing arch development, improving self-esteem, minimizing trauma and preventing periodontal problems.

Among possible advantages are higher compliance, emotional satisfaction, growth potential, the possibility of a more simplified second phase, a possible reduction of extractions in the second phase and, of course, issues related with practice management. Disadvantages also exist such as inefficiency, extended time of treatment, immaturity, inefficient oral hygiene, inability to take care of appliances, and cost. It is important for the orthodontist to weigh each of these benefits and risks to offer sound evidence and convincing reasoning for their decision to treat or not to treat. In this chapter a guide to timing orthodontic treatment is presented.

The ideal timing for treating malocclusions in growing patients has been a controversial and widely discussed topic throughout the history of orthodontics [1,6–10]. One of the most important debates in our field is whether to interrupt the development of problems with early treatment or to postpone therapy until later [1,9]. Such controversies are likely due to the lack of a scientific basis for therapeutic clinical decisions [8]. Historically, dentistry has been an empirical science. Even today, most dentists choose to employ solutions and techniques that were first learned in dental school, or those that they believe will

work [1,9]. In such cases, there is a high probability of treatment failure or a low-quality treatment outcome.

During the search for excellence in orthodontics, the concepts of effectiveness and efficiency have been emphasized [1]. Orthodontic clinical decisions should be scientifically based. Accordingly, treatment must be postponed until strong arguments in favor of beginning the therapy are present [9].

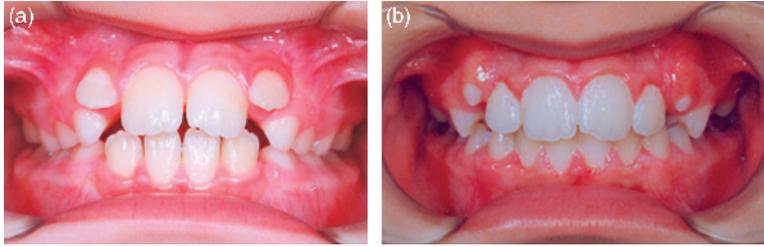
A follow-up protocol in which patients are re-examined periodically during growth and the development of occlusion allows the clinician to decide whether the cost/benefit of early treatment is justifiable. At this time, the program “preventive and interceptive orthodontic monitoring,” or simply PIOM, as devised by Souki [11] is introduced.

Conceptually, PIOM is a program of sequential attention that aims to monitor the development of “normal” occlusion and seeks to diagnose any factors that may compromise the quality or quantity of orthodontic treatment and the establishment of an appropriate occlusion. Seven objectives govern PIOM:

- 1 Provide prospective monitoring with a minimal intervention philosophy;
- 2 Provide comprehensive orthodontic care with functional and aesthetically harmonious adult occlusion as the ultimate goal;
- 3 Establish parameters so that orthodontists are not in a hurry to start treatment but are able to have a deadline to complete treatment;
- 4 Establish scientific parameters as guidelines for beginning therapy at each stage of maturation;
- 5 Respect the normal range of occlusal development;
- 6 Reduce dependence on patient compliance;
- 7 Delay phase II, if possible, until the time when second permanent molars can be included in the final occlusion.

During the years that separate the eruption of the first deciduous tooth and the full intercuspation of the second permanent molars, many morphogenetic influences and environmental factors act on the maturation of the dental arches and the occlusal pattern. Therefore, human occlusion should be viewed dynamically.

Clinicians must understand that during occlusal development, there is not just one line of ideal characteristics, but a wide range of normal characteristics. In the mixed dentition a larger variety of normal characteristics compared to the deciduous and permanent dentitions is encountered. Knowledge of normal features of occlusal



**Figure 1.1** a) Eight-year-old boy during “ugly duckling” phase presenting labial-distal displacement of maxillary lateral incisors and a diastema between the central incisors. b) Same patient three years later without any orthodontic treatment. The incisors’ alignment and leveling were naturally achieved.

maturation is important for the practice of orthodontics within PIOM. Throughout the history of medicine/dentistry, identifying signs or symptoms of a deviation from normal has been viewed as a situation requiring interceptive action. In lay terms, it has been thought that allowing a disease to evolve naturally (without therapy) may possibly make the disease more difficult to treat or even make it incurable [7]. This belief, when applied to orthodontics, may produce unnecessary interventions for occlusal characteristics that are totally within the range of normal (Figure 1.1), treatment of transitional deviations for which interceptive treatment (phase I) is not needed (Figure 1.2), and interceptive treatment before the appropriate time (Figure 1.3).

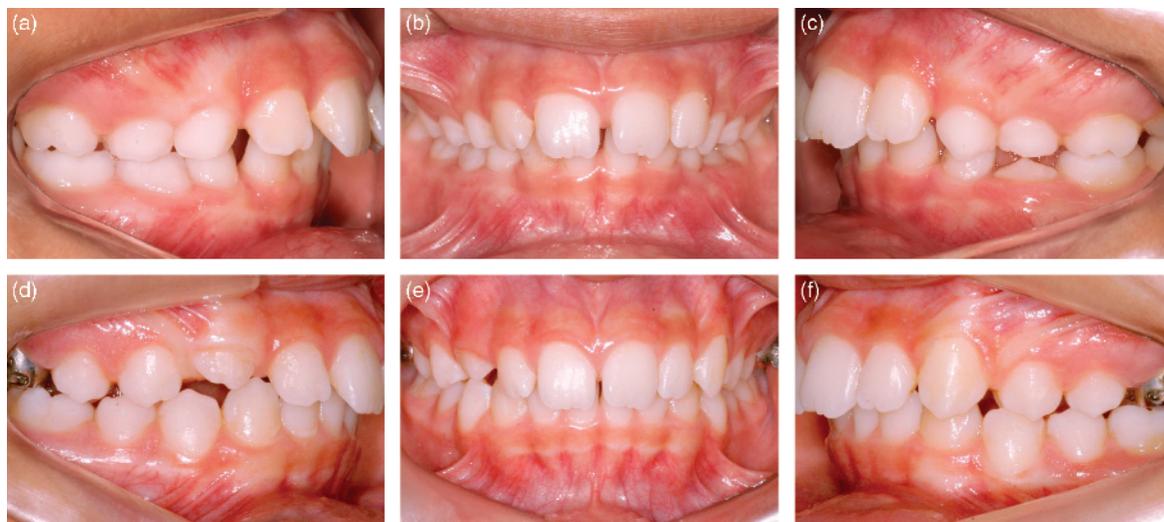
As mentioned previously, the orthodontist should focus on two key questions: the first deals with the ideal timing for interceptive orthodontics, incorporating the decision between one- or two-phase treatment, and the second hinges on identifying malocclusions that would benefit from an early intervention.

## 1.1 Occlusal deviations with indications for interceptive orthodontic treatment

Interceptive problems are those that, if not stopped during the course of their maturation, may become sufficiently severe to increase the complexity and difficulty of definitive treatment, compromise the final quality, or expose the individual to psychosocial conditions while waiting for a final corrective solution. Disagreements certainly exist among scholars regarding the clinical situations with indications for early orthodontic treatment. The list of issues presented by the American Association of Pediatric Dentistry [12] may serve as the starting point for this guideline. Based on their list, the following situations are suggested as candidates for early treatment: 1) prevention and interception of oral habits; 2) space management; 3) interception of deviations in eruption; 4) anterior crossbite; 5) posterior crossbite; 6) excessive overjet; 7) Class II



**Figure 1.2** a, b) Nine-year-old girl presenting deep bite and positive space discrepancy. Such transitional deviations (deep bite and positive space discrepancy) have no indication of interceptive orthodontics unless palatal soft tissue impingement is observed, or aesthetics is a major concern. c, d) Same girl five years later presenting significant natural improvements in the deep bite and space discrepancy with no phase I treatment.



**Figure 1.3** a–c) Nine-year-old mixed dentition boy with a Class II/1 malocclusion, but no psychosomatic concerns. The evaluation of a low/moderate risk of traumatic injuries in the maxillary front teeth indicated postponing to a single-phase orthodontic treatment. d–f) Patient at 12 years old, during early permanent dentition. No interceptive orthodontic treatment was performed. After 5 months of headgear appliance, the patient is now going into the 12–18 months multi-brackets comprehensive orthodontic treatment. Efficiency was achieved by postponing the Class II correction to a single phase approach.

malocclusion, when associated with psychological problems, increased risk of traumatic injury and hyperdivergence; 8) Class III malocclusion.

## 1.2 Ideal timing for early treatment

Several aspects must be considered by the clinician when deciding on the ideal timing for early treatment. Four basic considerations are: 1) psychosocial aspects; 2) the severity and etiology of the malocclusion; 3) the concepts of effectiveness and efficiency; 4) the patient's stage of the development.

### 1.2.1 Psychological aspects

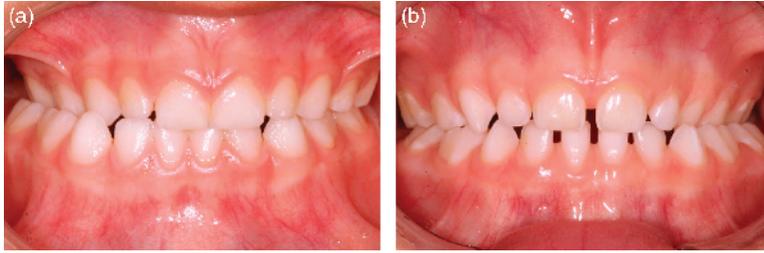
Psychological aspects are often neglected by orthodontists and unfortunately have not been routinely considered during the early treatment decision-making process [13,14].

At a time when bullying has been extensively discussed [15] and has been widely studied by psychopedagogues, clinicians must be constantly aware of the fact that, as providers, they can in many instances improve the self-esteem and quality of life (QoL) of their patients [16].

For many, the relationship between a patient's well-being and his/her malocclusion, along with possible associated sequelae has been thought to be of only minor importance [17]. Consideration must be given to each patient's QoL and the associated impact that postponement or avoidance of treatment may carry. Although somewhat vague and abstract, the concept of QoL is current and should be emphasized in orthodontics [18].

The literature provides evidence of an association between QoL and malocclusions. The methodologies of QoL studies, however, have not been homogeneous, and the samples are often constructed on the basis of convenience, making it difficult to offer a reliable analysis. The lack of randomized samples hinders the interpretation of the evidence [18,19].

Young people are motivated to seek orthodontic treatment because of their aesthetic dissatisfaction (13), referrals from dentists (20), parental concerns (13), and the influence of peers (21). Orthodontic treatment does improve QoL (19), but over time, the gain in QoL may be lost. When a malocclusion causes discomfort to a patient with the potential for generating a psychological imbalance (20), there is certainly an indication for early



**Figure 1.4** a) Posterior crossbite with mandibular shift, b) Posterior crossbite with no mandibular shift.

treatment (13), despite the fact that efficiency may be adversely affected [1].

### 1.2.2 Severity of the malocclusion

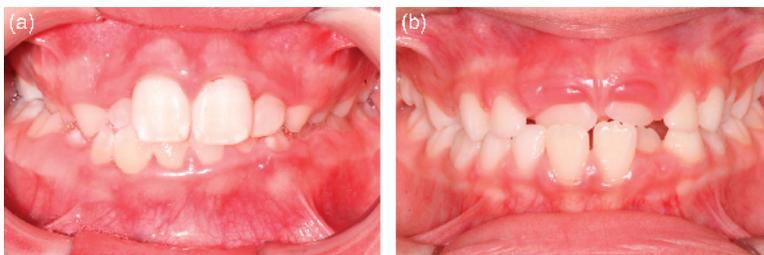
Malocclusions differ among patients presenting a wide range of severity. Therefore, it seems reasonable to think that, in infancy and adolescence, a mild malocclusion has a lower interceptive priority than a more severe one. For example, a posterior crossbite with mandibular shift (Figure 1.4) should have treatment priority as compared to malocclusions with minor shift or not associated with functional deviations. In the first scenario, the deviation can lead to asymmetric facial growth, making future therapy more complex [22]. There is less urgency for treatment of a single lateral incisor crossbite than a two-central-incisor crossbite, although there is a lack of evidence in the current literature (Figure 1.5). It must be understood that the severity of the malocclusion is not the only criterion for deciding on interceptive treatment. For example, if a Class III malocclusion is very severe in childhood, with skeletal components indicating that surgical correction may be required in the future, it is reasonable to consider delaying treatment until the end of growth to reduce extensive interceptive treatment [23]. In other words, in some situations, it is advisable to postpone the correction of the malocclusion

until a single-phase orthodontic-surgical treatment can be undertaken. On the other hand, many other Class III malocclusions in children may benefit greatly from an interceptive approach [24,25].

### 1.2.3 Effectiveness and efficiency concepts

The decision on the best time for orthodontic treatment must also consider the aspects of effectiveness and efficiency [10]. Effectiveness is a concept that expresses the ability to effectively solve a problem. Will it work at all? How much improvement will be produced? This concept is important in the search for excellence in orthodontics. Orthodontic interceptive actions should be considered if there is evidence that the problem to be treated will, in fact, be solved by early treatment. If the problem is not intercepted, will it lead to a less acceptable final result or cause greater difficulty in obtaining a good result?

Efficiency is a formula that correlates result with time. How much time will be needed to achieve the goals? Will the financial, biological, and interpersonal burden be worth the outcome? In the contemporary world, the concept of efficiency has been an important criterion in deciding implementations of actions and services. If the cost–benefit of a phase I is unfavorable, should one consider the benefits of early orthodontic treatment?



**Figure 1.5** a) Eight-year-old boy, Class I dental-skeletal pattern, presenting a single lateral incisor crossbite, b) Seven-year-old girl, Class I dental-skeletal pattern, presenting two central incisors crossbite. Because periodontal and growth impairments are more likely to happen in “b,” it is reasonable to infer that interceptive approach should be addressed urgently.

In summary, the treatment of malocclusions in children should be considered as an acceptable option if there is evidence that the outcome will add quality (effectiveness) and will be obtained with less effort (efficiency). Be sure to get the best result in the shortest amount of time possible.

### 1.2.4 Maturation stage of development

The orthodontist should consider several maturational aspects [26–28]. The presence of a minimal emotional maturity is essential for beginning any orthodontic procedure, even in patients with low-complexity malocclusions [29]. These considerations are essential to improve patient comfort [30] and to reduce the risk of accidents in young children. Thus, the cooperation of the child in the clinical examination becomes the first parameter used by orthodontists in judging the potential for early treatment. Depending on the child's behavior and compliance, the clinician will decide if orthodontic records should be taken. Psychosocial maturity is normally associated with chronological age. The American Association of Orthodontists (AAO) in its brochure *Your Child's First Check-up* recommends that children have a check-up with an orthodontic specialist no later than age 7. However, decisions about early treatment should be undertaken on an individual basis. Other parameters of maturity should also be considered. Assessment of the dental age should be made when intra-arch problems suggest early treatment. On the other hand, skeletal age should be used as a guide for the best time to intercept sagittal and vertical interarch problems [26,27].

In conclusion, it seems clear that a thorough consideration of all the factors described here will serve two purposes: 1) to determine whether or not early treatment is necessary; 2) to provide guidelines for determining when treatment should be initiated.

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