

One Phase versus Two Phase Treatment in Mixed Dentition: A Critical Review

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Abstract:

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. Mixed dentition treatment goals often focus on skeletal rather than dental correction. To design a treatment plan, the clinician must understand the growth and development patterns, and the known effects of the chosen treatment modality. 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 two areas that remain controversial in the orthodontic literature are the 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 researchers. Hence, we planned for review of all available literature to come to a consensus about preventive or interceptive orthodontics or in other words Phase 1 and Phase 2 treatment. The 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.

Key Words: Adolescent, children, interceptive orthodontics, mixed dentition, orthodontic treatment, preventive orthodontics, primary dentition

Introduction

“Timing is everything” holds best when it comes to treatment planning in orthodontics. It has been suggested that almost all types of malocclusion could be benefited from early treatment.

The effectiveness of the intervention depends on malocclusion. The main reason for the controversy seems to be our present knowledge about the timing of treatment; which is largely based on clinical experience with various clinical approaches and traditions of orthodontic practice. Scientific evidence is limited and few studies have specifically targeted questions about the effects of early treatment.¹ This article gives an overview and consensus of the literature to the clinician regarding the various studies related to the debate on “one phase versus two phase treatment in mixed dentition.”

A thorough literature review regarding the different schools of thought in the orthodontic management of mixed dentition period searched in the search engine (Viz: Google Scholar, Pubmed, Hinari, and various Indexing and open access sites) with key word of preventive,¹⁻⁴ interceptive,⁴⁻¹¹ mixed dentition,¹²⁻¹⁸ children orthodontic management,¹⁹⁻²⁷ one phase, two-phase orthodontic treatment²⁸⁻³⁰ in both title and abstract field. All articles thoroughly reviewed by the authors to come to a consensus regarding the role of pedodontist, oral surgeon, and orthodontist in multispecialty practice. The studies which met our criteria to clear the objective of one phase and two phase treatment were taken into consideration for reference.

Timing of Treatment

American Orthodontist Association recommends an orthodontic consultation for all kids by the age of 7 years. A goal of “early” orthodontic treatment is to correct existing or developing skeletal, dentoalveolar, and muscular imbalances to improve the orofacial environment before the permanent teeth eruption is complete.³¹⁻³³ The “epitome of dynamic orthodontic approach” is the beginning of the treatment in the deciduous dentition.³⁴ Lyman Wagers gave the term “pre orthodontic guidance” and “correction” in substitute for “prevention and interception” respectively.³⁵ Pre-orthodontic guidance-patients are having malocclusions in the deciduous or mixed dentition period, but do not require banding for corrective treatment.³⁶

The ideal time to start a Phase 1 treatment would be in the early mixed dentition, as soon as the upper lateral incisors are erupted. Early treatment is usually not considered in the primary dentition expect for few cases of cross bite, Class II and III malocclusion with crowding. Most of these primary dentition problems could be postponed, rather than be faced, with three phases of treatment 1st stage - primary dentition, 2nd stage - mixed dentition, and 3rd stage - permanent dentition.

The goal of orthodontic treatment is to get “the achievable normal occlusion which is esthetically pleasing and functionally stable.” Factors which influence orthodontic goal are not only the type of malocclusion, but also mechanotherapy or the type and duration of retention; but timing of treatment is equally important.³⁷

One phase versus two-phase treatment

Early intervention may reduce the overall need for complex orthodontic treatment like permanent tooth extraction or orthognathic surgery. This idea of intervention seems to be reasonable and it appears to be more logical to prevent an occurrence of abnormality rather than waiting until it has been developed fully.³⁸ In a recent survey on perception of the benefits of early treatment by Diplomats of the American Board of Orthodontics revealed the following responses; (1) greater ability to modify growth, (2) improved patient Self-concept and parental satisfaction, (3) better and more stable results, (4) later therapy required is less extensive; and (5) reduced potential for tooth damage.³⁸ The responses of this survey was supported by King *et al.*³⁹

Proponents of two-phase orthodontic treatment often argue that treatment in the late mixed dentition gives the clinician only one chance for correction, and if cooperation is poor the results may be unsatisfactory.⁴⁰ In addition, by delaying treatment in many female patients, who may have passed the peak velocity of their skeletal growth and strategies aimed at growth modification might reduce effectiveness.⁴⁰ Hence, treating Class II malocclusions in the early mixed dentition reduces the incidence of (1) premolar extraction, (2) root resorption (3) ectopic cuspid eruptions (4) with better patient cooperation, and (5) reduced need for surgical orthodontics.⁴¹ The randomized retrospective study results by University of Pacific to evaluate treatment changes during early mixed dentition treatment indicated that the approximate 42% of patients who received early treatment did not require a second phase of treatment.⁴¹ Subjects requiring full treatment and Phase 1 treatment had fewer visits, shorter treatment times, and lower expenses. In addition, 82% of subjects in the early treatment group did not require extraction in the permanent dentition.⁴¹

Another proposed benefit of the early orthodontic intervention in Class II malocclusions is improved self-concept. A multicenter, randomized, controlled trial conducted by providing an early functional appliance treatment for children aged between 8 and 10 years; who presented with Class II division 1 malocclusions in comparison with age and sex-matched subjects who were in control group (untreated) revealed the higher self-concept and more positive childhood experiences than the untreated controls.⁴² However, all the clinicians won't agree for this fact; many are preferring to wait until all the permanent teeth have erupted (excluding third molars) to start treatment.⁴²

Opponents of two-phase treatment argue that earlier treatment have few benefits which are unique. At least 90% of growing patients can be treated successfully in the late mixed dentition in only one phase and remaining 10% could benefit from immediate resolution of the problem such as those presenting with crossbites or Class III malocclusions.⁴³ Opponents of two-phase treatment argue that patients probably only have a limited capacity to cooperate, and dual treatments that require two phases of compliance and retention may be more.⁴⁴ Opponents also argue that there is no benefit concerning how the patients perceive themselves during early Class II treatment. The research on children with Class II malocclusions concerning early treatment and its effect on self-evaluation or perceiveness of the patients indicated that there was no change in mean self-concept score in treated subjects, and there was no association between improved perception about themselves regarding the reduction of Class II malocclusion.⁴⁵ These findings suggest that these children are generally not present with low self-esteem for treatment and on an average, self-concept does not improve during early orthodontic treatment.⁴⁵ A randomized clinical trial of preadolescent versus adolescent treatment of children with severe Class II malocclusions having an overjet greater than 7 mm showed no statistically significant results at the end of Phase 2 treatment.⁴⁶ In addition, two-phase treatment appeared to be inefficient to reduce the average time a child spent in fixed appliances nor did it reduce the complexity of later treatment.⁴⁶

A multicenter, randomized clinical trial on the effectiveness of twin-block functional appliance during early orthodontic treatment carried out at United Kingdom in the “real world” of orthodontic practice outside dental schools showed that, treatment with the twin block appliance reduced overjet, corrected molar relationship, and reduced the severity of the malocclusion.⁴² The majority of the correction was attributed to dentoalveolar changes and small amounts of favorable skeletal change. The study continued until the children had completed Phase 2 treatment with an aim whether early treatment resulted in a reduced need for Phase 2 treatment, and if differences in the skeletal pattern or final dental occlusion were evident.⁴² At the end of Phase 2 treatment, there was no difference between both the group of patients; for any variable evaluated, and most treated subjects required a second phase of treatment.⁴² In conclusion, these findings agree with other studies that early orthodontic treatment for Class II malocclusions does not confer any advantage over a later single phase treatment.^{45,46} The Class II division 1 treatment in early and late period showed that treatment time and PAR scores decreased with increasing dental development, indicating that early Class II division 1 treatment is less efficient and less successful than a later one phase treatment.⁴⁷

On comparison with non-extraction Class II samples; both one-stage and two-stage groups exhibited similar patterns of skeletal change that could not be distinguished from

each other.⁴⁸ Skeletal changes in both groups were largely responsible for molar and overjet corrections. The magnitude of differential jaw growth was greater in the two-phase group presumably because treatment started earlier and finished later.⁴⁸ One more similar comparative study observed an early mandibular response in patients treated with a Bionator.⁴⁹ The data revealed that the sagittal jaw relationship improved significantly in both Phase 1 treatment groups compared with the observation group. However, this initial mandibular response was not evident after both groups had received full appliance therapy. This study differed from previous studies in that it used centrophographic analysis.⁴⁹

Coming to the debate in orthodontics today, Dr. Paul Reggiardo, trustee of American academy of pediatric dentistry says “ask a roomful of dentist and orthodontists what is the best age to start treating children? And you will get many answers.” As we’re talking about two concepts, i.e. Orthodontics and Dentofacial Orthopedics explains Dr. Donald.F, president of the California society of pediatric dentists and professor and chairman of pediatric dentistry at UCLA hence suggesting two problem categories justifying the two phase treatment.⁵⁰ However, Brodie’s statement on Genetic Paradigm-the pattern of growth is unchanging and immutable, i.e. growth is under a tight genetic control which leaves the rationale for early growth modification under debate. The American Orthodontist Association recommends that all kids to see an orthodontist by the of age 7 years; however practitioners like Dr. Alan Bloore consider that only 1/3rd of patients receiving two-phase orthodontic treatment actually need it in true sense.⁵⁰ Though the two-step process costs more in time and money, proponents believe it achieves good results. The parents opt for two-phase treatment less out of fear; wanting to be proactive and not just reactive.”⁵⁰

Conclusion

Nevertheless, the treatment in mixed dentition opens the door for an orthodontist and a pedodontist to apply his judgment and experience. Proper diagnosis and treatment planning can produce the most satisfying results during the mixed dentition stage. It is here we have growth to assist us, the hard tissues are highly responsive to forces applied and soft tissue shows a higher degree of adaptability, thereby enhancing the stability of results. On the other hand, lack of careful planning can lead to disastrous results. It should be remembered that there is generally greater danger in: “Too much too soon, rather than in too little too late.”

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