

Introduction to Interceptive Orthodontics

Increasingly, parents of elementary school children are seeking treatment for early correction of their children's dental irregularities. Unfortunately, they quickly realize that their options are limited and inadequate. Their options have two key problems. The first issue stems from orthodontists not proactively addressing many types of early dental irregularities. This can cause a malocclusion to increase in severity over time. The second issue is a lack of efficient appliances and techniques.

The ideal orthodontic solution intercepts a developing problem (malocclusion) before it can increase in severity and corrects it definitively, eliminating the need for additional extensive treatment. It should start and finish when children are in elementary school (early mixed dentition). At this age, tissue adaptation and response is optimal, and children are enthusiastic about braces. Therefore, they are willing to cooperate with their treatment. The ideal solution should also minimize cost, treatment time, and the need for extraction of teeth.

This paper will present a few common options and briefly introduce an interceptive approach that provides a good treatment option for young children.

Common Approaches

Currently, orthodontists, based on their training and experience, tend to use one or more of the following approaches:

Minimal - This approach recommends using a comprehensive "one phase" treatment once all the permanent teeth have erupted. Interceptive treatment is avoided, except for correction of impacted molars or anterior and posterior crossbites. When early interception is required, the remaining components of malocclusion such as overjet, overbite, open bite, etc. are addressed in the second phase of treatment.

Generally, orthodontists try to time the comprehensive treatment to coincide with the onset of the adolescent growth spurt (11-13 years old for girls and 12-14 for boys). The objective is to modify jaw growth by using orthopedic appliances such as headgear or Herbst. Permanent teeth are extracted to provide space to correct moderate and severe arch length deficiencies or excessive protrusions. This comprehensive orthodontic treatment usually takes 2-4 years.

The minimal approach has several drawbacks:

- *Increased severity* - Some forms of malocclusion worsen with age. For example, a mild or moderate overjet or crossbite can become more severe between the ages of 7 and 11. In some instances, increased severity can cause a case that originally only needed orthodontic treatment to now require orthognathic surgery.
- *Social aspects and patient cooperation* - Adolescent children want to be socially accepted. This need for acceptance makes them less enthusiastic about wearing braces and more reluctant to follow through with or cooperate with the needed mechanical requirements. Therefore, orthodontic treatment that coincides with this crucial age is more likely to involve compromises and less likely to achieve the desired results.
- *Need for extraction* - By the time eruption of the permanent dentition is complete, the hard and soft tissue components of the jaws are less adaptable. Orthodontic treatment that begins at such an age is more likely to involve extraction of the permanent bicuspids. A 1989 study showed that the rate of extraction amongst American orthodontists is between 25% - 85%. [1]
- *Incidence of injuries* - Children with protrusive maxillary incisors are more prone to traumatic incisor fractures before adolescence. [2]

Two Phase - As the name suggests, this approach prescribes two phases of treatment. Phase I usually involves orthopedic approaches to expand (RPE), retract (headgear), or protract (facemask) the maxilla. Some additional appliances used include the two-by-four, lingual holding arch, TPA, and quad-helix. The objective of this approach is to limit the extent of Phase II.

Ideally, Phase I lasts one to two years and is followed by a Phase II of one to two years once all the permanent teeth have erupted. Oftentimes, however, the combined treatment time of both phases can extend to 5-7 years.

The main issues with this approach are increased costs and longer treatment time because two phases of treatment are required. Another issue is the lack of a standard treatment protocol. A number of appliances can be used with this approach, and each can be manipulated in various ways. As a result, there is no consensus treatment protocol available for orthodontists to follow.

Functional - Functional appliances were originally developed in Europe and found their way to the US in the '70s. These appliances are designed to improve dental and occlusal discrepancies by changing mandibular posture. This approach can be used as a stand-alone treatment or as part of the aforementioned two-phase approach. Removable functional appliances include the Monoblock, Bionator, Frankel and Twin Block. Several fixed forms of functional appliances are also used, such as the Herbst or Mara.

The main problem with the functional approach is its lack of practicality. Removable functional appliances are bulky, uncomfortable, and change the speech while being worn. This makes it difficult for children, particularly adolescents, to wear them. The fixed

variety is also bulky, uncomfortable, and prone to breakage. Also, the majority of patients treated with functional appliances have to go through an additional phase of fixed appliance therapy with added hardship and costs to the patients.

Extraction - Removal of deciduous or permanent teeth has been presented separately or along with the different strategies of orthodontic treatment mentioned previously. “Serial Extraction” was one of the older regimens that involved extraction of some of the deciduous and permanent teeth. Other extraction scenarios can be lumped together as eruption guidance strategies to facilitate eruption of permanent teeth in crowded conditions.

The problems with this approach are first that it results in the atrophy of the alveolar bone that houses and surrounds the extracted teeth. Second, many patients simply do not want to have their teeth removed.

Optimized Early Interception – This approach leverages the biological and social advantages of the early mixed dentition (7 -8 years old), instead of waiting for the adolescent growth spurt.

It uses highly efficient mechanics to address most of the skeletal and dental components of malocclusion during the early mixed dentition. It takes advantage of the less robust, but more adaptive, response that is the hallmark of the mixed dentition growth period. The adolescent growth spurt is reserved to correct the few unusually severe skeletal malocclusions that do not respond adequately to the early treatment.

The key advantages of this interceptive protocol are as follows:

- *Systematic approach* – It simplifies the operational aspects of treating various malocclusions by using the same basic appliances. This provides a repeatable process with predictable results.
- *Accelerated treatment* – Uses deciduous molars and canines as anchors to accelerate treatment of many mixed dentition cases such as anterior crowding, open bite, overbite, and crossbite. Treatment takes about two years and the need for a phase II is eliminated in 90% of cases. For the 10% of cases in which phase II is necessary, it involves a less-complex, more cost-effective treatment that can be accomplished in less than a year.
- *Safety* – By maximizing the anchorage value of the appliances, it prevents development of iatrogenic problems such as impaction of second permanent molars.
- *Efficient* - In addition to being cost-effective and time-efficient, this protocol eliminates the need to extract teeth by 99%.

To get more detailed information about this approach, please read *Interceptive Orthodontic Treatment: Efficient Early Correction of Malocclusions*.

Bibliography

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- [2] Artun J, Behbehani F, Al-Jame B, Kerosuo H. Incisor trauma in an adolescent Arab population: prevalence, severity, and occlusal risk factors. *Am J Orthod Dentofacial Orthop* 2005;128:347-52