



A REVIEW ON LONG TERM EFFECTS OF EARLY ORTHODONTICS INTERVENTION

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ABSTRACT

Early orthodontic treatment, also known as interceptive orthodontics, aims to address dental and skeletal issues in children during their growth phases. This proactive approach focuses on preventing more complex orthodontic problems by intervening in the mixed dentition phase (ages 6-10). The benefits include improved dental alignment, facial aesthetics, and reduced need for extensive future treatments. Common interventions include functional appliances, space maintainers, and expanders to guide jaw growth and tooth alignment. Despite its advantages, early orthodontic treatment can present challenges such as extended treatment time, patient compliance, and financial costs. Research shows that early intervention can provide long-term stability in correcting malocclusions, but it requires careful consideration of individual growth patterns. This article provides an overview of the benefits, potential risks, and long-term outcomes of early orthodontic treatment, emphasizing the importance of a personalized, growth-focused approach to care.

Keywords: Early Orthodontic Treatment, Interceptive Orthodontics, Mixed Dentition, Malocclusion

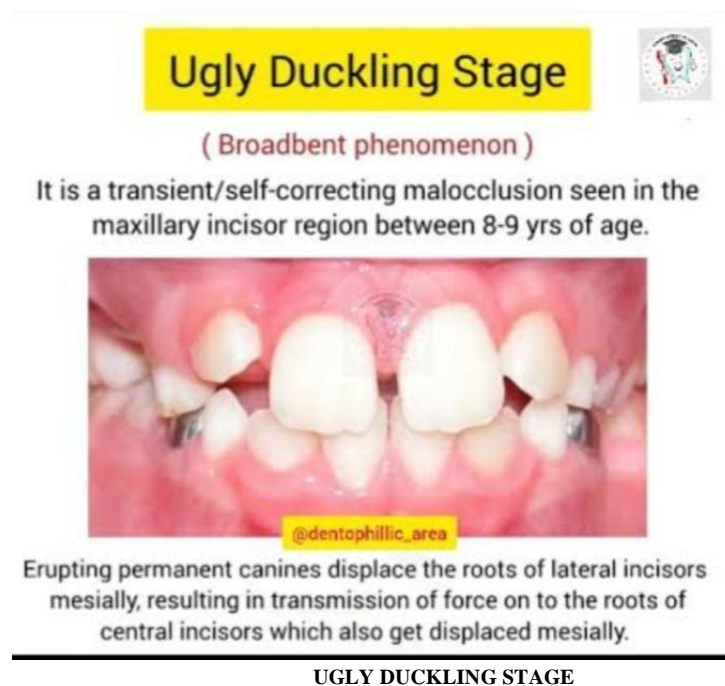
Introduction

Early orthodontic intervention, often referred to as interceptive orthodontics, is a proactive approach in managing dental and skeletal irregularities in children during their growth and development stages. Unlike traditional orthodontic treatment, which is typically initiated during adolescence when permanent dentition is fully established, early intervention aims to address potential problems during the mixed dentition phase, usually between the ages of 6 and 10 years. The primary goal of early orthodontic treatment is to influence the growth and development of the jaws and teeth, preventing the progression of malocclusions that might require more complex and invasive treatments later in life.^{1,2} Common conditions that warrant early orthodontic intervention include severe crowding, crossbite, open bites, excessive overjet, and skeletal discrepancies in jaw alignment. Treatment modalities often involve functional appliances, space maintainers, and expanders, designed to guide growth and establish a stable and harmonious occlusion. Early orthodontic intervention can have significant long-term effects on dental health, occlusal stability, and facial esthetics.² Studies indicate that early treatment can lead to substantial improvements in dental alignment and occlusion, which tend to remain stable over time. This approach can also reduce the need for more extensive orthodontic procedures later in life. Proponents of early orthodontic intervention argue that timely treatment can reduce the severity of malocclusions, improve facial aesthetics, enhance self-esteem, and, in some cases, eliminate the need for surgical correction or extraction of permanent teeth later in life. However, the cost-effectiveness and long-term stability of such treatments, citing potential risks of overtreatment, relapse, and the need for subsequent comprehensive orthodontic therapy during adolescence.^{3,4} This article gives an overview of long-term effects of early orthodontic interventions.

Phases, Timing, and Goals of Early Orthodontic Treatment:

Early orthodontic treatment focuses on addressing skeletal, dentoalveolar, and muscular variances to enhance occlusion and aesthetics before the eruption of permanent teeth. It begins with Phase 1, or interceptive orthodontics, typically around age 7 when children have most of their primary teeth, and the jaw is still growing. This phase identifies and treats issues like overcrowding, crossbites, and jaw discrepancies, such as a maxilla that grows excessively or is too narrow. Early intervention at this stage ensures that minor problems do not develop into severe oral health issues, potentially avoiding complex procedures later. It also creates space for permanent teeth, ensuring a proper eruption path and preventing impaction or misalignment. Early mixed dentition is considered the ideal time to initiate such corrections, as timely intervention can reduce the need for tooth extractions or surgical treatments. Phase 2 treatment, on the other hand, begins after all permanent teeth have erupted, typically during adolescence. This phase involves the use of fixed appliance, usually for an average of two years, to align teeth and jaws completely. The treatment focuses on refining the position of each tooth and achieving a harmonious relationship between the teeth, jaws, and facial profile. Retainers are used after fixed appliance to maintain the achieved results, ensuring the teeth remain in their corrected positions. The overarching purpose of early orthodontic treatment is to achieve a well-balanced functional and aesthetic outcome that remains stable throughout the patient's life. The ultimate goal is to position each tooth optimally in the oral cavity, ensuring compatibility with the lips, tongue, cheeks, and other teeth, enabling proper function and

enhancing the patient's smile and facial aesthetics. This comprehensive approach not only improves oral health but also boosts self-confidence and long-term quality of life.⁶

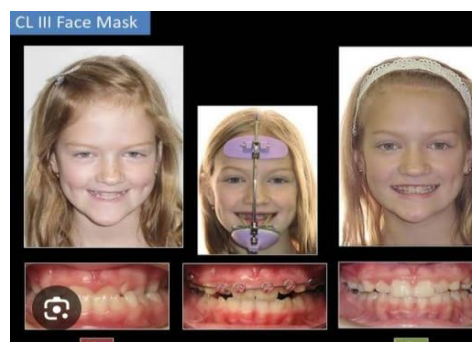


Advantages and Benefits of Early Orthodontic Treatment :

Early orthodontic treatment provides numerous advantages by addressing dental and jaw issues during a child's developmental years, ultimately reducing the need for more complex and costly procedures in the future. Early detection and correction of orthodontic issues, such as overcrowding, bite irregularities, jaw discrepancies, and habits like thumb-sucking or tongue thrusting, can prevent severe malocclusions later in life. Interceptive orthodontics creates space for crowded teeth, ensures proper jaw growth, and lowers the risk of damage to protruding teeth. It also addresses bite problems such as open bite, crossbite, and deep bite while promoting functional alignment of teeth, lips, and facial structure. Early treatment enhances facial symmetry, boosts overall oral health, and improves aesthetics, thereby increasing a child's self-esteem and satisfaction for both the child and parents. Additionally, early intervention guides jaw and dental arch development, leading to better, more stable results and reducing the duration of Phase 2 treatments. Preventive measures like space maintainers or palatal expanders create room for permanent teeth, minimizing the need for extractions or invasive procedures later. By improving both appearance and function, early orthodontic treatment ensures better long-term outcomes, enhancing a child's confidence and overall well-being.^{6,7}

Cons of Early Orthodontic Treatment:

Early orthodontic treatment, while beneficial, may not be suitable for all children due to various contraindications and challenges. Social immaturity or a lack of cooperation from the child can make treatment impractical, and parental pressure or reluctance may hinder the success of the intervention. Compliance can also be difficult, as younger patients may struggle with the responsibility of wearing appliances or maintaining proper hygiene, which can affect the treatment's effectiveness.⁷ Additionally, the risk of overcorrection exists, where early treatment may result in relapse or the need for further adjustments later on. The extended duration of treatment, including the potential for a second phase during adolescence, can increase both time commitment and financial costs. Families must weigh the financial implications, as early treatment often involves multiple phases, making it more expensive than waiting for comprehensive treatment in adolescence. Furthermore, while early orthodontic treatment aims to guide proper growth and alignment, concerns exist about its potential impact on natural development. Overzealous interventions could disrupt the normal growth.⁸



Review of literature

A retrospective study by Avreet Sandhu on 150 children aged 7–11 years demonstrated significant improvements in dental alignment, occlusion, and skeletal relationships following interceptive orthodontic treatment. Reductions in overjet (3.5 mm), overbite (2.1 mm), and ANB angle (2.8°) were statistically significant compared to untreated controls. The study concludes that early orthodontic intervention positively influences dental and skeletal development in mixed dentition.⁹ A retrospective study by Sinha, Abhishek on 150 patients with class II malocclusions treated between ages 7–10 showed significant reductions in overjet (from 8.5 mm to 3.0 mm) and overbite (from 4.0 mm to 1.5 mm), with stability over a 10-year follow-up. 85% maintained corrected occlusion, while 15% experienced minor relapse. The study concludes that early orthodontic treatment provides long-term stability in class II malocclusion corrections.¹⁰ A study by Heidi Kerosuo et al. suggests that systematically implemented early orthodontic treatment using simple appliances can largely eliminate the need for definitive treatment in the target population. Early timing of treatments contributed to the long-term stability of results, emphasizing the benefits of proactive intervention.¹¹ A study by Tabellion et al. found that reversed overjet (44.3%) and crossbites (41.4%) were the most common indications for early orthodontic treatment. Following early intervention, 87.1% of patients had no further orthodontic treatment need, with stable results observed in 61 out of 70 patients during late mixed dentition. The study concludes that timely early treatment effectively prevents or reduces the need for future interventions, particularly in cases of transverse anomalies or reversed overjet, Alam, Mohammad revealed that early orthodontic treatment for Class II malocclusions significantly improved dental alignment, with a mean overjet reduction of 3.2 mm and correction of Angle's Class II molar relationships in 80% of cases, The study demonstrated positive long-term stability of these outcomes. Early intervention proved effective in addressing malocclusion and ensuring sustained improvements.¹³

Long-Term Benefits and Considerations of Early Orthodontic Treatment

Early orthodontic treatment, especially for Class II malocclusions, has been shown to produce significant long-term occlusal improvements, with reductions in overjet and overbite that remain stable over extended periods. In a study of 150 patients, 85% maintained their corrected occlusion within clinically acceptable limits after a 10-year follow-up (Sinha et al., 2024). Early intervention in children as young as 3-5 years has also demonstrated its ability to resolve severe occlusion disorders, promoting the physiological development of the dentoalveolar system. After 3.5 years, 86% of cases showed physiological occlusion (Shishmareva & Bimbas, 2023).¹⁴ Systematic early orthodontic strategies in public health settings have proven effective in reducing the need for further orthodontic treatments. A Finish cohort study revealed that the treatment need decreased from 37% to just 3% by age 20, with notable improvements in occlusal stability (Kerosuo et al., 2013).¹¹ Furthermore, orthodontic treatment has been associated with improvements in facial esthetics, enhancing dental alignment and soft tissue characteristics. However, the ongoing natural aging process continues to affect facial features, which is important for managing patient expectations regarding long-term esthetic outcomes (Tanpure et al., 2024).¹⁵

Early Treatment of Class III Posterior crossbite with Anterior Openbite and Developing Underbite



This 7y 7mo young lady presented with a bilateral posterior crossbite, anterior openbite and developing Class III underbite. The decision was made to correct some of the more severe skeletal discrepancies now so that we have a manageable orthodontic case later.



Now at 9y 7mo, we have expanded her maxilla to correct her crossbite, opened space for the blocked out teeth, closed the openbite while pulling her upper jaw forward into a better relationship. At this point, we will monitor until the remaining permanent teeth have erupted and we can decide on full braces.

Early Orthodontic Intervention in Class III Malocclusion: Efficacy and Long-Term Outcomes

Early orthodontic management of Class III malocclusion, particularly during the mixed dentition phase, has been shown to provide significant benefits. For Pseudo-Class III malocclusions with localized anterior crossbites and functional mandibular shifts, early correction using removable or sectional fixed appliances effectively restores occlusal function, prevents adverse growth patterns, and reduces the risk of dental complications such as incisor recession. In cases of skeletal Class III malocclusions associated with maxillary retrusion, treatment involving rapid maxillary expansion (RME)

combined with protraction headgear has demonstrated short-term improvements in sagittal jaw relationships, as evidenced by increases in ANB angle and changes in maxillary and mandibular positions. Long-term studies, such as the Mandall trial, highlight that early intervention can reduce the need for orthognathic surgery by nearly half, with 36% of treated patients requiring surgery compared to 64% in the untreated group. However, some of the initial morphological effects of protraction headgear may diminish over time, especially in patients with increased vertical proportions or reduced overbite at baseline, who are less likely to exhibit sustained improvements. While early treatment demands patient commitment, its potential to minimize future surgical interventions and improve occlusal and facial outcomes makes it a valuable strategy, particularly when tailored to individual growth patterns and malocclusion characteristics.^{3,16}

An untreated Class III malocclusion with anterior displacement from RCP (a) to centric occlusion (b) with associated incisal wear (a-c). This was subsequently treated with fixed appliances to camouflage the mild underlying skeletal III discrepancy (d, e). Earlier interception may have prevented the occurrence of the incisal wear.



Conclusion

Early orthodontic treatment provides various advantages, such as the early identification and correction of dental issues, enhanced facial symmetry, and preventive measures for future problems. However, it is crucial to carefully consider these benefits alongside potential challenges like extended treatment time, compliance difficulties, and financial costs. The decision to pursue early orthodontic intervention should be made after a comprehensive evaluation and discussion with a skilled orthodontist, taking into account the unique needs and circumstances of each child. While early treatment offers significant benefits, it is important to recognize the influence of natural growth and individual development, which can impact long-term treatment outcomes, underscoring the need for a tailored approach to care.

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