



Review Article

Assessing optimal timing for orthodontic intervention: A scoping review

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ABSTRACT

There is still debate over the ideal time to begin orthodontic treatment. To optimize growth potential and patient cooperation, definitive treatment typically is delayed until the late mixed dentition and is used to resolve functional issues and anomalies of dental development. However, for specific types of malocclusion, some medical professionals advise beginning treatment earlier. The degree of the malocclusion, the patient's age and level of development at the time the patient sought treatment, and the timing of the treatment interventions all had an impact. This article explains over all review of the timing of the orthodontic treatment.

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1. Introduction

Timing of orthodontic interventions has long been a factious issue, with early treatment being used in standard occurrence to prevent skeletal anomalies in all three planes to relieve crowding. The best idea to begin orthodontic treatment under various clinical circumstances is a topic of continuous debate among general dentists and orthodontists. The hour of the beginning of treatment expects basic significance since the objectives of orthodontic consideration should include minimal measure of intercession that yields the most advantage for every patient.

Every patient should only anticipate and accept the minimum orthodontic therapy necessary to achieve the best results while minimising their personal financial and physiological costs. As a result, there is discussion and a need for information on the treatment method that is most

efficient and capable of achieving the goals in a timely manner. The principal objective of early treatment is to improve or address orthodontic irregularities before they deteriorate and grow into additional extreme orthodontic issues that would be more difficult to address in Stage II and hurt the teeth and supporting construction.

Every action taken to rectify a developing malocclusion or to make future orthodontic treatment easier falls under the umbrella of interceptive orthodontics. According to some research, 15% of instances involving emerging issues in mixed dentition might be totally resolved with interceptive treatment, while 49% of cases could be improved. The general practitioner is in an ideal position to identify and address occlusal issues in an appropriate approach, making the targeted implementation of basic interceptive interventions essential and cost-effective.^{1,2}

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2. Basis of Early Treatment

2.1. Aetiology

Practitioners for early intervention, especially those who support continuous growth modification, often believe that malocclusion is mostly of an environmental nature. For instance, several studies have connected growth-related problems to soft tissue behaviour and location as well as abnormal habits. While it is obvious that some malocclusions have environmental causes—digit sucking, for instance, is known to cause localised malocclusions—the majority are the result of genetic and environmental interactions. Moreover, a complex interplay between signalling molecules, transcription factors, and extracellular matrix proteins controls craniofacial growth. It is well known that the *Dlx* genes' transcription factors play a crucial role in the development of the maxilla and mandible within the first branchial arch. Substantial skeletal face alterations have been known to result from these events being disturbed.^{3,4}

2.2. Advantages and disadvantages

According to Bishara, Justus, and Graber,⁵ in 1998, there are benefits and drawbacks to starting treatment early. The benefits include a decreased likelihood of premolars extraction, the possibility of not requiring a second phase of treatment, and need for orthognathic surgery. The downsides incorporate potential iatrogenic issues that might emerge with beginning early treatment, such as, dilaceration of roots, decalcification under bands left for a really long time, and impaction of maxillary canines.

2.3. Benefits/psychosocial considerations

There is evidence linking to a variety of dental abnormalities, including increased anterior spacing, overjet, overbite, and open bites. A malocclusion will have a detrimental socio-psychological effect because persistent taunting is known to damage one's perception of oneself. High-quality prospective research has advocated early therapy to address occlusal difficulties in those impacted rather than as a general approach because to the individual and frequently unpredictable nature of targeting.^{6,7}

Younger children are strong candidates for Phase I orthodontics, have high self-esteem and body-image, and expect orthodontics to improve their life, according to Tung and Kiyak, who researched the psychological factors that affect when children receive orthodontic treatment.⁸

2.4. Inter arch relationship

According to the flush terminal plane in relation to the second primary molars, which is present in 76% of primary dentitions, first permanent molars often erupt into a one-half unit II molar relationship. The mandibular first molar

relocates mesially in the open mixed dentition to close the primate space that is present distal to the lower primary canines, which prompts the early development of Class I molar relationship.

Also with loss of the second primary molars and during the establishment of the permanent dentition, the later mechanism takes place in an unspaced dentition. Because, there is larger difference between mesio-distal lengths of lower primary molars and subsequent premolars than there is in the maxilla, this encourages more mesial migration of the lower first molar. Prior to the permanent incisors' full eruption, there is typically a transient open bite in anteriors during their emergence. Change in the overjet after incisor eruption are typically minimal but could be wedged by the soft tissue environment.⁹

2.5. Early treatment of class II malocclusion

Delaying treatment until adolescence has shown to be no more successful than early intervention for managing increased overjet. Teasing and psychosocial issues continue to be the main reasons for intervening early in Class II malocclusions. The early elimination of an overjet, however, may have a preventive impact in regard to trauma, according to a recent Cochrane review. Incompetent lips, increased overjet, and greater incisal exposure at rest will predispose to dental trauma, and early management may be beneficial in these cases.

Kerosuo et al. investigated whether systematically emphasising early intervention could remove the need for orthodontic treatment in health care. The Dental Health Component (DHC) of the Index of Orthodontic Treatment Need was used to determine the need for treatment, and the Peer Evaluation Rating Index was used to determine the effectiveness of the therapy (PAR). The findings imply that an early intervention strategy could significantly lower the requirement for orthodontic care in public health care settings with constrained resources. Using the American Board of Orthodontics Objective Grading System (ABO OGS) and Comprehensive Clinical Assessment (CCA) approach created at IUSD, Hsieh compared the treatment outcomes of early treatment with those of late treatment. Results showed that compared to the late-treatment group, the early-treatment group had considerably longer treatment times and lower CCA ratings.^{10,11}

In a controlled clinical experiment conducted by Tulloch, Phillips, and Proffit at the University of North Carolina, children with a mixed dentition and a 7 mm overjet were randomised to either early treatment with headgear, a modified bionator, or observation. Although the reduction in Class II severity experienced by patients in both early treatment groups was roughly the same, as indicated by a shift in the ANB angle, the mechanism behind this change was distinct. The maxilla could move only so far forward in the headgear group, whereas

the mandibular length increased more noticeably in the functional appliance group.¹² In a 1998 study, Keeling looked at the anteroposterior cephalometric alterations in young patients receiving early treatment for Class II malocclusions at the University of Florida. He came to the conclusion that Class II molar relationships were repaired, overjets and apical base discrepancies were decreased, and posterior maxillary tooth movement was brought on by both bionator and head-gear treatments. A year after the termination of therapy, the skeletal changes, which were mostly caused by accelerated mandibular growth in both headgear and bionator individuals, remained stable, but dental movements resumed.

2.6. Early treatment of class III malocclusion

In the mixed dentition, anterior crossbites are a frequent finding with the maxillary lateral or central incisors displaced in lingual occlusion. Localized dental crossbites are simple to treat with either fixed or removable appliances. Indications for correction include: incisal wear, associated with occlusal displacement, and periodontal attachment loss labial to the lower incisors, related to persistent forward mandibular displacement; aesthetics, as anterior crossbites predispose to a Class III profile.

In cases with skeletal malocclusion with a moderately protruding mandible and a generally normal maxilla, chin cup therapy is recommended. Mandibular growth can be redirected vertically, the mandible can be moved backward, and the gonial angle can be closed to rebuild the jaw, among other orthopaedic consequences of a chin cup on the mandible. According to the evidence, mandibular protrusion treatment is effective when initiated during primary or early mixed dentition.

Patients with Class III malocclusions and a maxillary deficit have undergone therapy using the protraction facemask. The primary goal of early facemask therapy is to facilitate the maxilla's forward displacement through sutural development. Yet, it's never clear whether early intervention can support subsequent mandibular growth during the pubertal growth surge. In a prospective clinical investigation, it was discovered that protraction facemask therapy beginning in the mixed dentition was stable 2 years after the appliances were taken out of the mouth. This was most likely caused by overcorrection and using a functional appliance as a retainer for a year.¹³

Ngan claimed that due to their inability to forecast mandibular growth, doctors occasionally hesitate to provide Class III patients with early orthopaedic treatment. By the end of the growing period, patients who received early orthodontic or orthopaedic treatment can require surgery. A methodical approach to Class III malocclusion diagnosis can assist in identifying patients who may benefit from early orthopaedic treatment. According to him, discriminant analysis revealed that the Wits evaluation was the most

effective at differentiating between surgical treatment and camouflage treatment.¹⁴

2.7. Intra arch features

As the combined width of the permanent incisors is 7mm and 5mm wider than the primary incisors in the maxillary and mandibular arches, respectively, crowding of the incisors is common in the mixed dentition. When the inter-canine dimension widens, the primate spacing closes, and the permanent incisors' proclination lengthens the arch, a resolution or improvement frequently results. Since the erupting teeth are close to the distal root surfaces of the more mesial neighbouring teeth, permanent maxillary incisors undergo distal fanning, also known as the "ugly duckling" or "Broadbent" stage, before the eruption of lateral incisors and canines. Prior to the eruption of the maxillary canines, a related maxillary midline diastema is also thought to be physiological. Thus, it is not necessary to intervene to close this space before the maxillary canines emerge.

Between the ages of 9 and 13, the canines and premolars should erupt. Crowding causes available space to be utilized on a "first come, first served" basis, impaction of the canines and second premolars being typical as a result. For instance, primary crowding may result in the buccal impaction of maxillary canines or the displacement of lateral incisors. Early loss of the primary molars and subsequent mesial migration and rotation of the first permanent molar in the second premolar region may exacerbate this.¹⁵

2.8. Early correction of transverse problem

Using fixed or removable appliances, including auxiliary devices like quadhelix or fast palatal expanders, posterior crossbite can be corrected. If there is an associated occlusal displacement, early crossbite treatment may be done because, if left untreated, this may lead to occlusal wear, periodontal issues, and facial asymmetry. Nevertheless, there isn't any information that compares the stability or efficacy of crossbite correction in various age groups. Early crossbite correction is successful in the primary dentition, according to retrospective studies, however later correction is the more widely acknowledged method.¹⁶

2.9. Early correction of vertical discrepancy

A variety of fixed or removable appliances may be used to try and correct an anterior open bite early. The prognosis varies on etiology, for example, open bite is caused by abnormal habits, like digit sucking, often respond well to early therapy, as is the case with many other early treatments. Skeletal open bites that are the result of growth require more sophisticated treatment, though they may be more amenable to permanent dentition restoration if later growth occurs.

Soft tissue behaviour and pattern have also been linked to anterior open bites. Some retroactive evidence has been used to justify the use of fixed auxiliaries, such as tongue spurs, to change tongue posture. Attention has been paid to the early application of myofunctional therapy in an effort to treat abnormal neuromuscular behaviour, especially in Europe. Although more research is required to demonstrate the treatment's effectiveness, it is predicated on the idea that a malocclusion is connected to muscle behaviour and oral function. In a pilot trial involving 22 kids between the ages of 7 and 11 years, Van Dyck et al. showed a minor improvement in posture and tongue elevation with a corresponding rise in the occurrence of a complete overbite.¹⁷

The issue with skeletal open bites is greater. The aptitude to change vertical facial growth appears to be limited and may require prolonged intervention, which is taxing on patient compliance and runs the risk of negative repercussions, similar to the care of skeletal abnormalities. With little evidence of skeletal effectiveness, numerous treatment approaches, such as high-pull orthopaedic headgear directed via the centre of resistance of maxilla, vertical-pull chin cups, and functional appliance variants, have been recommended.

3. Conclusion

The degree of the malocclusion, the patient's age and level of development at the time the patient sought treatment, and the timing of the treatment interventions all had an impact. When treating children at a young age, the orthodontist can legitimately stop worrying about tooth location and start "re-directing" growth trends.

Even though neither of these procedures actually exists as a distinct technique, concerns of treatment time all too frequently turn into arguments about early vs late treatment. Because of this, orthodontists should think of it as the "Treatment Sequence" and this as an acceptable order for implementing a treatment process established from the diagnostic facts and projections relevant to the case in question.

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None.


5. Conflict of Interest


None.

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