

Timing of orthodontic treatment

Mahesh Jain, Nidhi Dhakar¹

Department of Orthodontics and Dentofacial Orthopedics, Manipal College of Dental Sciences, Mangalore, Karnataka,

¹Department of Oral Pathology, Pacific Dental College and Hospital, Udaipur, Rajasthan, India

ABSTRACT

General dental practitioners are the first to examine and screen children for developing malocclusions and hence they are most responsible for correct diagnosis and referral. They are often faced with the dilemma of deciding at what age to refer for a further opinion and treatment. This entirely depends on the problem that has been diagnosed and the dental state of the child, but there is always a question that is there an “ideal” time for orthodontic treatment, if the clinician wants to maximize the benefits of growth and development without subjecting every child to fixed mechanotherapy for years. The controversy surrounding early versus late orthodontic treatment is often frustrating and confusing to the dental fraternity. This article looks into both sides of the issue for orthodontic treatment of Class II and III malocclusions along with the problems in the transverse dimension and vertical dimension. Early orthodontic treatment is effective and desirable in specific situations. However, the evidence in the form of Randomized Control Treatment is equally compelling that such an approach is not indicated in many cases for which later, one-phase treatment is more effective and efficient. Therefore, dental practitioners must decide on the basis of their experience and clinical judgment when to advise orthodontic treatment. For many patients, delaying the treatment may be advisable to obtain advantage from dental and skeletal development.

Key words: Early, late, orthodontic, treatment, timing

Introduction

There is an ongoing discussion among general dentists and orthodontists regarding the optimal time to initiate orthodontic treatment under various clinical conditions. Since the objectives of orthodontic care must include the minimal amount of treatment that achieves the maximum benefit for each patient, the timing of the commencement of treatment becomes of paramount importance. Each patient should expect and receive only that amount of orthodontic treatment that minimizes both the biologic and financial cost to them and yet obtain the optimal outcome. Hence there is a debate and need for information as to which treatment modality is most effective and can achieve the objectives in an appropriate time.

Overall goal of early treatment is to improve or correct orthodontic problems that would result in irreversible damage to the dentition and supporting structure and progress into a more severe orthodontic problem that would be more difficult to treat in Phase II.

White^[1] in 1998 had suggested indications for early treatment which includes posterior and anterior crossbites, ankylosed teeth, excessive protrusions, severe anterior and lateral open bites, cleft palates, ectopic molars, Class III with true maxillary retrusions. But however, there are few limitations and exceptions to early orthodontic intervention which includes Class II malocclusion with mandibular prognathism and bimaxillary protrusions with severe arch length discrepancies.

Advantages and disadvantages associated with early treatment as listed by Bishara, Justus, and Graber^[2] in 1998 include reduced incidence of premolar extraction, possible elimination of the need for a second phase of treatment, minimum need for surgical orthodontics, whereas disadvantages include potential iatrogenic problems that may occur with early treatment such as dilaceration of roots, decalcification under bands left for too long, impaction of maxillary canines by prematurely uprighting the roots of the lateral incisors, impaction of

Access this article online

Quick Response Code:



Website:
www.jorthodr.org

DOI:
10.4103/2321-3825.123320

Address for correspondence: Dr. Mahesh Jain, Department of Orthodontics and Dentofacial Orthopedics, Manipal College of Dental Sciences, Manipal University, Mangalore, Karnataka, India. E-mail: doctormaheshjain@gmail.com

maxillary second molars from distalizing first molars, and patient “burnout” as total treatment time is longer when considering the observation period between the two stages.

Tung and Kiyak^[3] studied the psychological influences on the timing of orthodontic treatment and suggested that younger children are good candidates for Phase I orthodontics, have high self-esteem and body-image, and expect orthodontics to improve their lives.

Early Treatment of Class II Malocclusion

Substantial evidence supports the theory that early growth modification therapy can lead to an improvement, if not complete correction,^[4] of the Class II malocclusion. Recently, the results of randomized clinical trials specifically designed to address these important issues were published.

Tulloch, Phillips, and Proffit^[5] conducted controlled clinical trial at university of North Carolina where patients in the mixed dentition with overjet of 7 mm were randomly assigned to either early treatment with headgear, or modified bionator, or to observation. Although patients in both early treatment groups had approximately the same reduction in Class II severity, as reflected by change in the ANB angle, the mechanism of this change was different. The headgear group showed restricted forward movement of the maxilla, and the functional appliance group showed a greater increase in mandibular length.

Keeling^[6] in 1998 examined anteroposterior cephalometric changes in children enrolled in a randomized controlled trial of early treatment for Class II malocclusion in University of Florida. He concluded that both bionator and head-gear treatments corrected Class II molar relationships, reduced overjets and apical base discrepancies, and caused posterior maxillary tooth movement. The skeletal changes, largely attributable to enhanced mandibular growth in both headgear and bionator subjects, were stable a year after the end of treatment, but dental movements relapsed.

Brien^[7] did a multicentered, randomized controlled trial to evaluate the effectiveness of early orthodontic treatment with the Twin-block appliance. Results showed that early treatment with the Twin block reduced overjets, corrected molar relationships and reduced the severity of malocclusions. Most of this correction was due to dentoalveolar changes and small amounts of favorable skeletal change. He concluded that early treatment with Twin-block appliances resulted in an

increase in self-concept and a reduction of negative social experiences.

Bremen and Pancherz^[8] assessed the efficiency of early and late Class II Division 1 treatment in the mixed and permanent dentition and stated that treatment of Class II Division 1 malocclusions is more efficient in the permanent dentition (late treatment) than it is in the mixed dentition (early treatment).

Pirttiniemi^[9] did an 8 year randomized trial to determine the long-term effects of early headgear (HG) treatment on craniofacial structures. The results showed that the most evident difference between the groups was the wider and longer dental arches in the HG group, which could only partly be explained by the higher rate of extractions in the control group. Peer assessment rating (PAR) score, showing the general outcome of treatment, was at the same level in both groups at follow-up.

Kerosuo *et al.*^[10] examined whether definite need for orthodontic treatment could be eliminated in public health care by systematically focusing on early intervention. Treatment need was assessed according to the Dental Health Component (DHC) of the Index of Orthodontic Treatment Need and treatment outcome by the Peer Assessment Rating Index (PAR). The results suggest that an early treatment strategy may considerably reduce the need for orthodontic treatment in public health care with limited specialist resources.

Hsieh^[11] compared the treatment outcome of early treatment with that of late treatment using the American Board of Orthodontics Objective Grading System (ABO OGS) and Comprehensive Clinical Assessment (CCA) method developed at IUSD. Result showed that the early-treatment group had significantly longer treatment time and worse CCA scores than the late-treatment group.

Early Treatment of Class III Malocclusion

Ngan^[12] has described the rationale for Early Timely Treatment of Class III Malocclusions that includes:

- To prevent progressive irreversible soft tissue or bony changes.
- To improve skeletal discrepancies and provide a more favorable environment for future growth.
- To improve occlusal function. CR/CO discrepancy
- To simplify phase II comprehensive treatment.
- Early treatment may eliminate necessity for orthognathic surgery.
- To provide more pleasing facial esthetics, thus improving the psychosocial development of a child.

Chin cup therapy^[13] is advocated in skeletal malocclusion with a relatively normal maxilla and moderately protrusive mandible. The orthopedic effects of a chin cup on the mandible include redirection of mandibular growth vertically, backward repositioning (rotation) of the mandible, and remodeling of the mandible with closure of the gonial angle.

Evidence suggests that treatment of mandibular protrusion is more successful when it is started in the primary or early mixed dentition.

The protraction facemask has been used in the treatment of patients with Class III malocclusions with a maxillary deficiency. The main objective of early facemask treatment is to enhance forward displacement of the maxilla by sutural growth. However, there is always an ambiguity whether early treatment can sustain subsequent mandibular growth during pubertal growth spurt.

In a prospective clinical trial, protraction facemask treatment starting in the mixed dentition was found to be stable 2 years after the removal of the appliances. This is probably due to the overcorrection and the use of a functional appliance as retainer for 1 year.

Mitani^[14] concluded that although the mandibular chin position will be greatly improved anteroposteriorly during the initial stage (2 years) of chin cup therapy, the changes do not take place continuously after that, and the initial changes will not be maintained if chin cup use is discontinued before facial growth is complete.

Ngan^[15] stated that clinicians are sometimes reluctant to render early orthopedic treatment in Class III patients because of their inability to predict mandibular growth. Patients receiving early orthodontic or orthopedic treatment might need surgical treatment at the end of the growth period. A systematic way to diagnose Class III malocclusion can help in identifying patients who might respond favorably to early orthopedic treatment. According to him, Discriminant analysis found that the Wits appraisal was most decisive in distinguishing camouflage treatment from surgical treatment.

A Wits appraisal greater than -5 indicates that the malocclusion might not be resolved by camouflage treatment with facemask or chin cup therapy. He proposed the use of serial cephalometric radiographs of patients taken a few years apart after facemask treatment and the use of a Growth Treatment Response Vector (GTRV) analysis^[12] to individualize and enhance the success of predicting excessive mandibular growth in Class III patients. A

GTRV analysis will then be performed during the early permanent dentition to allow clinicians to decide whether the malocclusion can be camouflaged by orthodontic treatment or whether a surgical intervention is necessary when growth is completed.

Pangrazio-Kulbersh^[16] compared the long-term stability of early protraction facemask treatment with later surgical maxillary advancement with LeFort I osteotomy, and to determine whether early intervention with protraction facemask is an effective treatment modality or whether surgical treatment after cessation of growth should be advocated. The investigation demonstrated that Orthodontic and surgical treatments both produced positive changes in the anteroposterior position of the maxilla, and these changes remained stable over time. Both treatment modalities produced acceptable clinical improvements and stable long-term results. Early treatment with orthopedic forces to advance the maxilla might reduce altogether the need for surgical intervention later. If surgery becomes necessary, it might be restricted to only one jaw, thereby minimizing complications and increasing the stability.

Early Transverse Treatment

Evidence suggests that a lateral shift of the mandible into unilateral crossbite occlusion may promote adaptive remodeling of the TMJ joint and asymmetric mandibular growth. Favorable improvement of mandibular asymmetry associated with a mandibular shift is seen in patients treated in the early mixed dentition.^[12,17]

A child exhibiting a lateral functional shift is a candidate for early orthopedic correction. Such a shift is often the result of compensatory and habitual movement of the mandible to achieve intercuspation in the face of a constricted maxillary arch. In this situation, the mandible approaches centric relation with facial and dental midlines coinciding.

Increased maxillary width removes the premature contacts, eliminates the mandibular shift, and allows the mandible to achieve centric relation with coinciding midlines.

Assuming good balance in sagittal and vertical jaw relationships, selective enamelplasty of 1 or 2 deciduous teeth to eliminate an occlusal interference, mandibular shift, and crossbite is appropriate in the primary dentition.

Early Open Bite Treatment

The diagnosis and treatment of skeletal hyper-divergent open bite^[18] continues to be one of the most challenging

situations facing orthodontists today. Control of abnormal habits and elimination of dysfunction should be given top priority in the deciduous dentition. Screening appliances intercept and eliminate all abnormal perioral muscle function in acquired malocclusions resulting from abnormal habits, mouth breathing, and nasal blockage.

A removal or fixed appliance can inhibit tongue thrust in a mixed dentition. In such cases, a stretch reflex is elicited from the closing muscles that enhances the depressing action on the buccal segments and helps in closing the anterior open bite.

Conclusions

The timing of treatment interventions was influenced by the severity of the malocclusion and the age and maturation of the patient at the time the patient presented for treatment. In treating at early age, the orthodontist can reasonably become a “re-director” of growth patterns rather than solely a worrier of tooth position.

Too often, discussions of treatment timing become debates about early treatment versus late treatment when in truth, neither of these procedures exist as entities. Therefore, orthodontists should consider it as “Treatment Sequence” and define this as a reasonable temporal order for instituting a treatment procedure developed from the diagnostic facts and projections pertaining to the case under examination.

The resolution of the malocclusion and stability of the correction is not an accident of early or late treatment. It is the result of a planned treatment sequence designed to suffer a minimum effect from the limiting factors of orthodontic treatment while taking a maximum assist from the positive factors.

References

1. White L. Early orthodontic intervention. *Am J Orthod Dentofacial Orthop* 1998;113:24-8.
2. Bishara SE, Justus R, Graber TM. Proceedings of the workshop discussions on early treatment. *Am J Orthod Dentofacial Orthop* 1998;113:5-6.
3. Tung AW, Kiyak HA. Psychological influences on the timing of orthodontic treatment. *Am J Orthod Dentofacial Orthop* 1998;113:29-39.
4. Wheeler TT, McGorray SP, Dolce C, Taylor MG, King GJ. Effectiveness of early treatment of Class II malocclusion. *Am J Orthod Dentofacial Orthop* 2002;121:9-17.
5. Tulloch JE, Proffit WR, Phillips C. Outcomes in a 2-phase randomized clinical trial of early Class II treatment. *Am J Orthod Dentofacial Orthop* 2004;125:657-67.
6. Keeling SD, Wheeler TT, King GJ, Garvan CW, Cohen DA, Cabassa S, *et al.* Anteroposterior skeletal and dental changes after early Class II treatment with bionators and headgear. *Am J Orthod Dentofacial Orthop* 1998;113:40-50.
7. O'Brien K. Is early treatment for Class II malocclusion effective? Results from a randomized controlled trial. *Am J Orthod Dentofacial Orthop* 2006;129(4 Suppl):S64-5.
8. Von Bremen J, Pancherz H. Efficiency of early and late Class II Division 1 treatment. *Am Orthod Dentofacial Orthop* 2002;121:31-7.
9. Pirttiniemi P, Kantomaa T, Mäntysaari R, Pykäläinen A, Krusinskiene V, Laitala T. The effects of early headgear treatment on dental arches and craniofacial morphology: An 8 year report of a randomized study. *Eur J Orthod* 2005;27:429-36.
10. Kerosuo H, Väkiparta M, Nyström M, Heikinheimo K. The seven-year outcome of an early orthodontic treatment strategy. *J Dent Res* 2008;87:584-8.
11. Hsieh TJ, Pinskaya Y, Roberts WE. Assessment of orthodontic treatment outcomes: Early treatment versus late treatment. *Angle Orthod* 2005;75:162-70.
12. Ngan P. Early Timely Orthodontic Treatment. *Semin Orthod* 2005;11:140-5.
13. Campbell PM. The dilemma of Class III treatment. Early or late? *Angle Orthod* 1983;53:175-91.
14. Mitani H. Early application of chin cap therapy to skeletal Class III malocclusion. *Am J Orthod Dentofacial Orthop* 2002;121:584-5.
15. Ngan P. Biomechanics of maxillary expansion and protraction in Class III patients. *Am J Orthod Dentofacial Orthop* 2002;121:582-3.
16. Pangrazio-Kulbersh V, Berger JL, Janisse FN, Bayirli B. Long-term stability of Class III treatment: Rapid palatal expansion and protraction facemask vs LeFort I maxillary advancement osteotomy. *Am J Orthod Dentofacial Orthop* 2007;131:7.e9-19.
17. McNamara JA Jr. Early intervention in the transverse dimension: Is it worth the effort? *Am J Orthod Dentofacial Orthop* 2002;121:572-4.
18. English JD. Early treatment of skeletal openbite malocclusions. *Am J Orthod Dentofacial Orthop* 2002;121:563-5.

How to cite this article: Jain M, Dhakar N. Timing of orthodontic treatment. *J Orthod Res* 2013;1:99-102.

Source of Support: Nil. **Conflict of Interest:** No.