Dentofacial Changes after Orthodontic Intervention with Eruption Guidance Appliance in the Early Mixed Dentition

Katri Keski-Nisula; Leo Keski-Nisula; Hannu Salo; Kati Voipio; Juha Varrela

ABSTRACT
Objective: To evaluate skeletal and dentoalveolar changes induced by the eruption guidance appliance in the early mixed dentition.

Materials and Methods: Pre- and posttreatment cephalometric radiographs of 115 consecutively treated children, 62 boys and 53 girls, were compared with those obtained from a control group of 104 children, 52 boys and 52 girls. Pretreatment radiographs were taken at the deciduous-mixed dentition interphase (T1) and after full eruption of all permanent incisors and first molars (T2). The mean age of the children in both groups was 5.1 years at T1 and 8.4 years at T2.

Results: A significant difference between the groups at T2 was found in the mandibular length, midfacial length, and maxillomandibular differential. The increase in mandibular length was 11.1 mm in the treatment group and 7.2 mm in the control group. No differences were found in measurements of maxillary position or size. There was a significant shift toward a Class I relationship in the treatment group. Labial tipping and linear protrusion of the mandibular incisors was evident in the treatment group at T2. There was no effect on the inclination or position of the maxillary incisors.

Conclusions: Occlusal correction was achieved mainly through changes in the dentoalveolar region of the mandible. In addition, the appliance enhanced condylar growth resulting in a clinically significant increase in mandibular length. No effect was observed on maxillary position, maxillary size, inclination or protrusion of the maxillary incisors, or facial height.

KEY WORDS: Early treatment; Eruption guidance appliance; Cephalometry

INTRODUCTION

Large individual variation in children's growth patterns and growth potential is usually considered to favor an individualized approach in orthodontic therapy. However, attempts have been made to apply more generalized interceptive measures in the community to reduce or eliminate malocclusion.¹,²

Väkiparta et al² studied the effects of an early treatment oriented orthodontic program for which a systematic screening at the age of 8 years was followed by early interceptive treatment. Examination of the children at the age of 12 years showed that the treatment need was significantly reduced. Al Nimri and Richardson¹ investigated the effectiveness of an interceptive program that targeted selected unfavorable features of the developing occlusion and showed that the change in the dental health component of the Index of Orthodontic Treatment Need (IOTN) was significantly greater in the treated children compared to the controls.¹

Neither of the studies cited above¹,² included Class II occlusion or Class II tendency to select children in the interceptive program. This seems to be in line with the recent findings suggesting that only minor benefits can be obtained by early treatment in Class II patients.³–⁶ However, other studies have reported considerably better results after an early intervention.⁷–⁹ A recent clinical trial investigated the occlusal effects of...
the eruption guidance appliance. Complete age cohorts of children were screened in the deciduous dentition, and orthodontic intervention with the eruption guidance appliance was carried out in the mixed dentition in children showing a tendency to Class II occlusion, crowding, increased overjet or overbite with lack of tooth-to-tooth contact between the incisors, anterior crossbite, and/or buccal crossbite (scissors bite). A comparison with an untreated control group with similar malocclusions revealed that an efficient Class II correction, along with a general normalization of the occlusal development, was achieved in the majority of the patients.

The purpose was to cephalometrically analyze craniofacial and dentoalveolar morphology in children who had undergone orthodontic intervention with the eruption guidance appliance in the early mixed dentition.

MATERIALS AND METHODS

The study population was collected from three rural municipalities in western Finland: Jalasjärvi, Kurikka, and Seinäjoki. The treatment sample of 115 children was derived from the 1992 and 1993 age cohorts in Jalasjärvi and from the 1992 age cohort in Kurikka. All children in these age cohorts were screened during the late deciduous dentition period, and those diagnosed as needing treatment received a full clinical examination at the onset of the mixed dentition period. Children were included in the treatment group if they showed one or more of the following occlusal characteristics: (1) distal step (≥ 1 mm), (2) Class II canine relationship (≥ 1 mm), (3) excess overbite (> 3 mm and lack of tooth-to-tooth contact between the incisors), (4) deep bite (> 3 mm with gingival contact of the incisors), (5) crowding, (6) anterior crossbite, and (7) scissors bite (buccal crossbite). The treatment group was treated using the eruption guidance appliance only (Figure 1). Children who had a moderately or severely constricted maxilla or a skeletal Class III relationship were first treated with an expansive arch and/or facemask. These children as well as those who refused the treatment or did not cooperate were excluded from the present analyses. The mean active treatment time was 3.3 years (range 5.1 to 8.4 years).
The control group was a random sample of 104 children from Seinäjoki (population 30,000) who fulfilled the same criteria, i.e., they represented the 1992 and 1993 age cohorts, were screened during the late deciduous dentition period, and had similar occlusal deviations. The children in the control sample received a full clinical examination, including collection of dental casts and lateral cephalograms at the onset of the mixed dentition period; but their treatment was not started until the late mixed dentition in accordance with the treatment protocol that was followed in the dental clinics of Seinäjoki. The treatment and control samples were all healthy Finnish children and none had undergone orthodontic treatment previously. Children and their parents were free to decline participation in the study at any time.

The timing of the examinations and interventions was based individually on the stage of dental development of each child and not on chronologic age. Treatment was started at the beginning of the mixed dentition period, i.e., when the first deciduous incisor was exfoliated (T1). Active treatment was completed after all permanent incisors and first molars were fully erupted (T2). The present investigation evaluates the skeletal changes that occurred from T1 to T2 in 115 consecutively treated children in the treatment group (62 boys and 53 girls) and 104 children in the control group (52 boys and 52 girls).

The mean age in both treatment and control groups was 5.1 years (SD ± 0.5) at T1 and 8.4 years (SD ± 0.5) at T2. During active treatment, each child wore two to three prefabricated eruption guidance appliances of different sizes (Nite-Guide or Occlus-o-Guide, Ortho-Tain Inc). The appliances were worn during sleeping hours only. If difficulties were encountered, daytime wear of 1 hour was recommended until the problems with night-wear disappeared. The average duration of active treatment was 3.3 years. At point T2 all treated children entered a retention period during which the last of the appliances was used as a retainer, two nights per week. The retention was continued until all permanent canines, premolars, and second molars were fully erupted. No further treatment was normally required or planned.

The lateral cephalograms were taken with standard cephalostats. Computer assisted analysis of the cephalograms was carried out by the first author. The landmarks and measurements used in the analysis are listed in Table 1. The cephalometric assessment was carried out as described previously. Occlusal characteristics were measured as described earlier. The differences between the sample means were tested with Student’s t-test. The relationships between continuous variables were further tested with simple linear regression and correlation analysis. A P-value difference < .05 was interpreted as statistically significant.

RESULTS

No statistically significant differences were detected between the treatment and control groups in the occlusal or cephalometric variables at the beginning of the study (Table 2). From T1 to T2, overjet and overbite decreased in the treatment group and increased in the control group (Table 2). In the treatment group, the sagittal relationship of molars improved by 1.9 mm and the canines by 1.5 mm. In the control group, the molar and canine relationship remained virtually unchanged showing a tendency to a Class II occlusion. Differences between the groups in overjet, overbite, and molar and canine relationship were statistically significant at T2.

In most skeletal variables an equal amount of growth took place in the treatment and control children during the observation period (Table 2). In addition, the growth direction of the mandible, measured by the facial axis angle, was similar on both groups. In midfacial length, mandibular length, and maxillomandibular differential, the treatment children showed a significantly greater increase compared with the controls. In mandibular length, the growth increment was 11.1 mm in the treatment group and 7.2 mm in the control group. The greater mandibular growth in the treatment group also largely explains the difference in midfacial length and the maxillomandibular differential. The Wits appraisal was significantly smaller in the treatment...
Table 1. Landmarks and Measurements

<table>
<thead>
<tr>
<th>Points</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nasion (Na)</td>
<td>Anterior limit of the nasofrontal suture</td>
</tr>
<tr>
<td>Orbitale (Or)</td>
<td>Lowest point on external border of orbital cavity</td>
</tr>
<tr>
<td>Porion (Por)</td>
<td>Most superior point of external auditory meatus</td>
</tr>
<tr>
<td>Basion (Ba)</td>
<td>Most inferior posterior point of occipital bone at anterior margin of occipital foramen</td>
</tr>
<tr>
<td>Sella (Se)</td>
<td>Midpoint of sella turcica</td>
</tr>
<tr>
<td>Anterior nasal spine (ANS)</td>
<td>Tip of anterior nasal spine</td>
</tr>
<tr>
<td>Posterior nasal spine (PNS)</td>
<td>Tip of posterior nasal spine</td>
</tr>
<tr>
<td>Pt point (Pt)</td>
<td>Intersection of inferior border of foramen rotundum with posterior wall of pterygomaxillary fissure</td>
</tr>
<tr>
<td>Gonion (Go)</td>
<td>Intersection of line connecting most distal aspect of condyle to distal border of ramus and line at base of mandible</td>
</tr>
<tr>
<td>Condylion (Co)</td>
<td>Most posterior-superior point on head of mandibular condyle</td>
</tr>
<tr>
<td>Pogion (Pog)</td>
<td>Most anterior point on mandibular symphysis</td>
</tr>
<tr>
<td>Menton (Me)</td>
<td>Most caudal point in outline of symphysis, formed at intersection of mandibular plane</td>
</tr>
<tr>
<td>Gnathion (Gn)</td>
<td>Cephalometric landmark formed by intersection of (1) tangent of most inferior point of symphysis and most inferior point of gonial region and (2) line connecting NA and Pog</td>
</tr>
<tr>
<td>Point CC (center of cranium)</td>
<td>Cephalometric landmark formed by intersection of Ba-Na and Pt-Gn lines</td>
</tr>
<tr>
<td>Point A</td>
<td>Deepest point of curve of maxilla between ANS and dental alveolus</td>
</tr>
<tr>
<td>Point B</td>
<td>Deepest point of curve of mandible between Pog and dental alveolus</td>
</tr>
<tr>
<td>PM (protuberance menti or supra pogonion)</td>
<td>Point selected where curvature of anterior border of symphysis changes from concave to convex</td>
</tr>
<tr>
<td>XI point</td>
<td>Point at geographic center of ramus</td>
</tr>
<tr>
<td>AI incisor</td>
<td>Incisal tip of maxillary incisor</td>
</tr>
<tr>
<td>BI incisor</td>
<td>Incisal tip of mandibular incisor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Planes and angles</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maxilla to cranium</td>
<td>Distance from Point A to NA-perpendicular (constructed by dropping line vertically inferior to An and perpendicular to Frankfort horizontal); describes sagittal position of anterior border of maxilla to cranium</td>
</tr>
<tr>
<td>Mandible to cranium</td>
<td>Distance from Pog to NA-perpendicular; describes sagittal position of chin in relation to cranium</td>
</tr>
<tr>
<td>Anterior cranial length</td>
<td>Measured from Point CC to Na along the Ba-Na plane; describes length of anterior cranial base</td>
</tr>
<tr>
<td>Convexity</td>
<td>Point A to plane from Na to Pog; describes sagittal relation of maxilla to mandible</td>
</tr>
<tr>
<td>Lower facial height</td>
<td>Angle formed by XI-ANS plane and XI-Pog plane</td>
</tr>
<tr>
<td>Condylion to point A</td>
<td>Describes effective midfacial length</td>
</tr>
<tr>
<td>Condylion-gnathion</td>
<td>Describes effective mandibular length</td>
</tr>
<tr>
<td>Maxillomandibular differential</td>
<td>Difference between distance from Co to Point A and distance from Co to Gn; evaluates sagittal skeletal imbalance</td>
</tr>
<tr>
<td>Menton-ANS</td>
<td>Describes lower anterior face height</td>
</tr>
<tr>
<td>Facial axis angle</td>
<td>Angle formed by Point CC-Gn plane and Ba-Na plane; describes growth direction of mandible</td>
</tr>
<tr>
<td>Mandibular plane to Frankfort horizontal</td>
<td>Angle formed by mandibular plane and Frankfort horizontal; describes shape mandible</td>
</tr>
<tr>
<td>PNS-ANS</td>
<td>Measure of maxillary length</td>
</tr>
<tr>
<td>PNS-A</td>
<td>Measure of maxillary length</td>
</tr>
<tr>
<td>Interincisal angle</td>
<td>Angle formed by long axes of maxillary and mandibulary incisors</td>
</tr>
<tr>
<td>B1 to A-pogonion plane</td>
<td>Measured from tip of mandibular incisor to plane from Point A to Pog; describes protrusion of mandibular incisors</td>
</tr>
<tr>
<td>A1 to A-pogonion plane</td>
<td>Measured from tip of maxillary incisor to plane from Point A to Pog; describes protrusion of maxillary incisors</td>
</tr>
<tr>
<td>IMPA</td>
<td>Angle formed by long axis of mandibular incisor and mandibular plane; describes inclination of mandibular incisors</td>
</tr>
<tr>
<td>A1 to S-Na</td>
<td>Angle formed by long axis of maxillary incisor and Se-Na plane; describes inclination of maxillary incisors</td>
</tr>
<tr>
<td>Wits appraisal, mm</td>
<td>Distance between perpendicular projection from Point A to occlusal plane and perpendicular projection from Point B to occlusal plane (measured along the occlusal plane); evaluates horizontal skeletal relationship</td>
</tr>
</tbody>
</table>

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Table 2. Occlusal and Cephalometric Variables in the Treatment and Control Groups at T1 and T2. The Differences Between the Groups at T1 Were Nonsignificant

<table>
<thead>
<tr>
<th></th>
<th>Treatment Group at T1</th>
<th>Control Group at T1</th>
<th>Treatment Group at T2</th>
<th>Control Group at T2</th>
<th>Difference Between Treatment and Control Group at T2</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
<td>SD</td>
<td>Mean</td>
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<tr>
<td><strong>Occlusal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overjet (mm)</td>
<td>3.0</td>
<td>1.4</td>
<td>2.9</td>
<td>1.8</td>
<td>1.9</td>
</tr>
<tr>
<td>Overbite (mm)</td>
<td>3.2</td>
<td>1.6</td>
<td>3.3</td>
<td>1.9</td>
<td>2.0</td>
</tr>
<tr>
<td>Molar relationship (mm)</td>
<td>0.6</td>
<td>1.7</td>
<td>0.5</td>
<td>1.7</td>
<td>-1.3</td>
</tr>
<tr>
<td>Canine relationship (mm)</td>
<td>1.6</td>
<td>1.6</td>
<td>1.4</td>
<td>1.7</td>
<td>0.1</td>
</tr>
<tr>
<td><strong>Maxillary skeletal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A/Na-verticale (mm)</td>
<td>-0.7</td>
<td>2.6</td>
<td>-0.4</td>
<td>2.5</td>
<td>-1.4</td>
</tr>
<tr>
<td>Condylion-A (mm)</td>
<td>80.6</td>
<td>3.9</td>
<td>80.8</td>
<td>4.7</td>
<td>86.3</td>
</tr>
<tr>
<td>SNP-SNA (mm)</td>
<td>46.8</td>
<td>2.5</td>
<td>47.6</td>
<td>2.5</td>
<td>49.8</td>
</tr>
<tr>
<td>SNP-A (mm)</td>
<td>43.8</td>
<td>2.4</td>
<td>44.5</td>
<td>2.2</td>
<td>46.1</td>
</tr>
<tr>
<td>Anterior cranial length (mm)</td>
<td>54.9</td>
<td>3.0</td>
<td>55.3</td>
<td>3.1</td>
<td>54.9</td>
</tr>
<tr>
<td><strong>Mandibular skeletal</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pogonion/NA-verticale (mm)</td>
<td>-9.4</td>
<td>4.9</td>
<td>-8.5</td>
<td>4.2</td>
<td>-9.0</td>
</tr>
<tr>
<td>Condylion-gnathion (mm)</td>
<td>96.9</td>
<td>5.1</td>
<td>98.2</td>
<td>5.9</td>
<td>108.0</td>
</tr>
<tr>
<td>Facial axis angle (°)</td>
<td>92.5</td>
<td>3.4</td>
<td>92.3</td>
<td>3.2</td>
<td>91.0</td>
</tr>
<tr>
<td>Mandibular plane/Frankfort horizontal</td>
<td>24.6</td>
<td>4.9</td>
<td>24.2</td>
<td>4.9</td>
<td>27.6</td>
</tr>
<tr>
<td><strong>Maxillomandibular differential</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maxilla to mandible</td>
<td>16.3</td>
<td>3.2</td>
<td>17.3</td>
<td>3.6</td>
<td>21.8</td>
</tr>
<tr>
<td>Convexity (mm)</td>
<td>4.6</td>
<td>1.9</td>
<td>4.3</td>
<td>2.1</td>
<td>3.2</td>
</tr>
<tr>
<td><strong>Facial height</strong></td>
<td>56.0</td>
<td>3.8</td>
<td>57.0</td>
<td>3.9</td>
<td>61.2</td>
</tr>
<tr>
<td>Lower facial height (mm)</td>
<td>44.8</td>
<td>3.9</td>
<td>44.3</td>
<td>5.8</td>
<td>44.4</td>
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<tr>
<td><strong>Incisal relationships</strong></td>
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<td></td>
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<tr>
<td>A1/A-Pogonion (mm)</td>
<td>3.7</td>
<td>1.7</td>
<td>4.0</td>
<td>1.9</td>
<td>6.7</td>
</tr>
<tr>
<td>B1/A-Pogonion (mm)</td>
<td>-0.2</td>
<td>2.3</td>
<td>-0.1</td>
<td>2.3</td>
<td>3.8</td>
</tr>
<tr>
<td>Interincisal angle (°)</td>
<td>148.6</td>
<td>13.9</td>
<td>145.0</td>
<td>13.9</td>
<td>126.2</td>
</tr>
<tr>
<td>Wits appraisal (mm)</td>
<td>0.5</td>
<td>2.8</td>
<td>0.1</td>
<td>3.2</td>
<td>-1.9</td>
</tr>
<tr>
<td>IMPA (°)</td>
<td>87.8</td>
<td>7.5</td>
<td>89.7</td>
<td>7.3</td>
<td>97.0</td>
</tr>
<tr>
<td>AI to S-Na (°)</td>
<td>91.7</td>
<td>10.5</td>
<td>92.7</td>
<td>14.2</td>
<td>104.1</td>
</tr>
</tbody>
</table>

group at T2, indicating a better intermaxillary relationship in comparison to the control group.

The treatment did not seem to have any effects on the protrusion or angulation of the upper incisors (Table 2). The lower incisors, on the other hand, became more protruded and more labially inclined in the treatment group. At the same time, the interincisal angle decreased.

Correlations between the occlusal characteristics at T1 and skeletal variables at T2 were analyzed in the control group where no intervention was carried out. In general, the correlations were low and of little clinical relevance. However, a moderate and statistically significant positive correlation \( r = .4, P < .0001 \) was found between the width of the upper dental arch at T1 and the length of the mandible at T2. This suggests that a narrow upper deciduous dental arch was associated with less growth of the mandible. Tracings of two treatment children and one control are shown as Figures 2, 3, and 4 respectively.

**DISCUSSION**

The eruption guidance appliance has been shown to be capable to correct many aspects of the developing occlusion including overjet and overbite, openbite, spatial deficiencies, and Class II molar relationship. The present results are consistent with earlier findings indicating that the skeletal changes induced by the eruption guidance appliance are largely restricted to the dentoalveolar region. However, treatment with the eruption guidance appliance seems
to significantly enhance mandibular growth. The man-
dibular length, measured from condyion to gnathion,
increased 3.9 mm more in the present treatment sam-
ple compared to the controls during the study period;
this is equivalent to extra growth of 1.2 mm per year.
Janson et al15 studied a group of 30 patients who were
 treated with the eruption guidance appliance for 26
months and reported a similar annual enhancement in
mandibular length. The present results are in agree-
ment with the earlier findings15 in that the maxillary
growth is not affected. Similarly, direction of the facial
growth remained unaffected.

Many studies have indicated that the growth of the
mandible can be influenced by functional appliances
in the middle or late mixed dentition.15,17–22 The present
results indicate that an orthopedic effect on mandibu-
lar growth can be achieved even earlier, in the early
mixed dentition. In an analysis of treatment effects of
the FR-2 appliance of Fränkel, McNamara et al16 found
that the growth response was greater in the older pa-
patients with a starting age of 11.5 years compared to
the younger patients with a starting age of 8.5 years.
The annual growth increment was 1.8 mm in the older
group and 1.2 mm in the younger group.18 The growth
rate in the present treatment sample was 1.2 mm per
year. These figures are in line with suggestions that
the best response to functional therapy in terms of
mandibular growth is achieved at or near the peak
of the pubertal growth spurt.23,24 However, it seems ob-
vious that a clinically significant orthopedic effect that
contributes to the correction of the Class II molar re-
lationship can be obtained at almost any age in grow-
ing children.

The eruption guidance appliance is designed to
solve crowding by expanding the dental arches.11 Be-
cause a transverse deficiency of the upper dental arch
is a common finding in Class II patients,25 it is possible
that this expansion,9 in addition to the mandibular
growth, enhanced the transition from a Class II to a
Class I relationship. It is of interest that a moderate
but significant correlation was found between the width
of the upper dental arch at T1 and mandibular length
at T2. This suggests that a narrow upper arch tends
to restrict anterior mandibular growth in early mixed
dentition.

A recent analysis of untreated Class II subjects in-
dicated that the effect of mandibular growth that po-
tentially could bring the lower dentition forward, seems
to be lost because of intercuspal locking and subse-
quent adaptive movements of the dentoalveolar com-
plex.26 Earlier, Johnston27 suggested that the key ef-
fect of a functional appliance is to displace the man-
dible forward and let the condyle grow into the fossae
without producing maxillary dentoalveolar compensa-
tions.

In the present study, the changes in occlusion and
Wits appraisal toward a Class I relationship were sig-
nificantly greater in the treatment group compared to
controls. On the other hand, no differences were found
in measurements that describe the position of the an-
terior border of the maxilla and mandible in relation to
the cranium. It thus seems that a major effect of the
eruption guidance appliance was indeed to induce a
change in the dentoalveolar component without signif-
ically affecting the position of the basal skeletal com-
ponents. Johnston27 further suggested that the forward
displacement of the mandible, typical to functional ap-
pliances, would cause a relative retrusive effect on
maxillary dentition. However, no such effect was evi-
dent in the present study as the maxillary dentition
seemed to move forward equally in both groups. The
present findings are thus in agreement with the pre-
vious results indicating that the eruption guidance ap-
pliance does not cause a significant restriction of an-
terior growth of maxilla.15

A significantly smaller overjet, overbite, and interin-
cisal angle were observed in the treatment group com-
pared to the controls at the end of the study. More
pronounced labial inclination and more anterior posi-
tion of the lower incisors in the treatment group seem
to be the main factors that affected the incisor rela-
tionships. There seemed to be no treatment effect on
inclination or protrusion of the maxillary incisors.
These findings differ from those of a previous study
that showed bodily protrusion, but unchanged incla-
nation of the lower incisors and protrusion and labial in-
clination of the upper incisors after treatment with the
eruption guidance appliance.15 Linear retrusion and lin-
gual tipping of the maxillary incisors seem to be fre-
frequent findings also with other functional applian-
ces.18,22,28–31 The different response of the incisors ob-
served in the present study may relate to the fact that
the present patients were younger and that the treat-
ment took place during the period when the permanent
incisors were erupting.

On the basis of the existing literature, Proffit31 sug-
gested that early Class II treatment is indicated only
for a selected group of children. However, many stud-
ies have shown that a Class II relationship does not
show spontaneous correction with growth.9,26,32–35 In-
stead, the skeletal and occlusal features of Class II
tend to become exaggerated with age. It would, there-
fore, be logical to seek a treatment modality that would
offer a method to intercept and correct Class II devel-
opment at an early stage of occlusal development.
The eruption guidance appliance seems to be a prom-
ising candidate for such a purpose.9 Not only Class II
relationships but many other signs of disturbed occlu-
sal development such as crowding, excess overjet,
deep bite, and openbite can be treated simultaneously with this appliance in the early mixed dentition.9

Long-term results of the present trial are not yet available, but clinical data, accumulated on the treatment effects of the eruption guidance appliance, suggest that an early intervention can produce results efficiently and consistently. After treatment and proper retention, children who have undergone early orthodontic treatment with the eruption guidance appliance do not normally require further treatment.

CONCLUSIONS

• Occlusal correction brought about by the eruption guidance appliance was achieved mainly through changes in the dentoalveolar region of the mandible.
• Condylar growth was enhanced resulting in a clinically significant increase in mandibular length.
• No effect was observed on maxillary position, maxillary size, inclination, or protrusion of the maxillary incisors, or facial height.

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