of the contents, and applied it by brushing for 15 seconds, fol-
lowed by 5 seconds of drying with moderate and then strong
air pressure. We then proceed-
ed in the same way as with the
primer, dipping the brush into
it several times to ensure infil-
tration and filling of the dentin-
al surfaces with the adhesive
resin.

Shortly after application of a layer of universal adhesive –
Optibond XTR (bottle no. 2) – without polymerisation we
injected the NX3 adhesive di-
rectly into the crowns with the
help of an auto-mixing syringe.

Once the crown was in place, a 1-second polymerisation at
a distance caused the NX3 ad-
hesive to achieve a gel-like con-
sistency, allowing us to remove
the excess easily. Final poly-
merisation was achieved in 40
seconds on each surface, aided
by the self-cure material.

Modern adhesive techniques,
combined with the use of ap-
propriate bonding mat etrials,
enabled us to place several cer-

vical composites, as well as two
crowns, helping this patient to
smile at his grandchildren with
out fear of being teased.

Two phase treatment of a Class II division 1
patient complicated by traumatic upper inci-
sor intrusion: A Case Report

By Dr. Roelien Stapelberg

Phase I

A female patient pre-
sented at the age of 7
years and 8 months
with the complaint that one of
her upper teeth were absent.
She had a mild thumb sucking
habit with a tongue thrust. She
had a Class II division 1 incisor
relationship on a Class II skel-
etal base with mildly decreased
vertical facial proportions.

Extra-oral examination (Figure 1a-c)

Extra-orally the patient pre-
sented with a Class II skeletal
pattern convex profile and ac-
ccentuated labiobasal fold. She
had acceptable vertical facial
proportions. The frontal ex-
amination revealed acceptable
facial symmetry and balance,
with the upper centric line coin-
cident with the midfacial axis.
Soft tissue examination dem-
onstrated thin upper and lower
lips with mild incompetence,
as well as an acute nasolabial an-
gle. The lower lip was retrusive to
Bickel's E-line.

Intra-oral examination (Figure 1d-h)

The patient was in the early
mixed dentition and had good
oral hygiene. There was no
history of dental caries, and no
active dental caries. Mild
generalized extrinsic stain-
ing was present. Furthermore
there were no restorations pre-
sent. The maxillary arch was
symmetric and tapered, whereas the mandibular arch was
square and symmetric. Both arches had no space de-
ficiency and had well aligned buccal segments. The upper
right central incisor was miss-
ing, and the upper left central
incisor was procined.

In occlusion, the overjet mea-
sured 10mm, with no overbite
present. The molar relation-
ship on the left was full Class II,
and the right side was ¾ Class II.
The lower centerline was 2mm
to the left of the upper centerline, which was coinci-
dent with the facial center.
There was no crossbites or dis-
placements.

The Dental Health Compo-
nent (DHC) of the Index of
Orthodontic Treatment Need
(IOTN) was 5i, and the Aesthet-
ic Component (AC) was 9.

Radiographic examination (Figure 2a,b)

The DPT demonstrated that all
second molars were present and
developing, as well as the
lower third molars. The upper
right central incisor seemed to
be horizontally impacted.

The cephalometric analysis
confirmed our clinical findings
of a Class II skeletal pattern
with an ANB of 7.0°. The Wits appraisal confirmed the Class
II skeletal pattern with a mea-
surement of 7.5 mm. The ver-
tical proportions were slightly
degraded, demonstrated by the
maxillary-mandibular plane angle of 90.7° and face
height ratio of 52.1%. The up-
per incisors were severely pro-
dowed at 128.9°, as was the low-
er incisors at 106.0°. The lower
incisors were retruded relative
to the APo line with a measure-
ment of -0.8mm.

Problem list
1. UR1 Horizontally impacted
2. Class II skeletal pattern due
to mandibular retrognathia
3. Convex profile
4. Increased overjet
5. Lower centerline 2mm to the
left of the upper centerline
Aims and Objectives
1. Facilitate eruption of UR1
2. Correct Class II skeletal pat-
tern by encouraging mandibu-
lar growth
3. Improve facial profile
4. Decrease overjet to within
normal range

Establish coincident center-
lines
6. Maintain result until comp-
prehensive orthodontic therapy

Treatment plan
1. Upper hybrid TPA - tongue
crib appliance to assist in
breaking the thumb sucking
habit and relieve the present
tongue thrust, while reinforc-
ing the anchorage of the UR6 &
UL6.
2. Upper x24 pre-adjusted edge-
wise fixed appliances (0.022* x
0.028* slot) with MBT prescrip-
tion. Upper utility arch 0.016 SS
with an open coil spring to
create and maintain adequate
space for the UR1.
3. Surgical exposure of the
UR1 via the open technique
– without polymerisation we
injected the NX3 adhesive di-
rectly into the crowns with the
help of an auto-mixing syringe.

When the position of the UR1
was at an adequate level, it was
engaged on the 0.016 SS with an
elastic tie. The time pe-
riod from surgical exposure of
the UR1 to alignment with the
archwire was 5 months. The
bonded upper fixed retainer and an
upper fixed retainer from UR1 –
UL1 was placed.

Treatment assessment (Figure 1a-g)

Case one was a 7 years and 8
months old Caucasian female
presenting with a Class II divi-
sion 1 incisor relationship on a
Class II skeletal base with mild-
ly decreased vertical facial pro-
portions. The mandible was
retrognathic, and the maxilla
normal. The malocclusion was
complicated by a horizontally
impacted UR1. The patient pre-
sented with no space deficien-
cy. The upper centric line with
on the face midline, and the
lower centerline was 2mm to the
left of the upper. The mo-
lar relationship was full unit
Class II on the left and ½ unit
Class II on the right.

Phase I treatment was deemed
appropriate, and consisted of
a hybrid TPA-tongue crib ap-
ppliance with x24 upper pre-
adjusted edgewise fixed ap-
plications (0.022* x 0.028* slot)
with MBT prescription. Surgi-

> Page 19
A female patient presented at 9 years 4 months of age for a retention check of her fixed upper retainer, still in place from her previous orthodontic treatment (Phase I). She had a Class II division 1 malocclusion, on Class II skeletal bases, with decreased vertical proportions, bimaxillary protrusion and a lower lip trap.

**Extra-oral examination**

Extra-orally the patient had a severe Class II skeletal pattern with a convex profile and acceptable vertical proportions of the face. Frontal examination revealed no transverse asymmetry, and the upper centerline was on with the midfacial axis, with lower centerline being shifted 2mm to the left. Soft tissue examination demonstrated a retruded and incompetent lower lip of normal thickness. A lower lip trap was also present.

**Intra-oral examination**

The patient was in the late mixed dentition and had good oral hygiene. There were no restorations, and the patient was caries free. The maxillary arch was ovoid and symmetrical with no space discrepancy. The buccal segments were well aligned, with mesial buccal rotation on the UR6 and UL6 present. The mandibular arch was well aligned with ovoid and symmetrical with no space discrepancy, with a deep curve of Spee present. The buccal segments of the lower arch was well aligned.

In occlusion the overjet measured 8.5mm, with an overbite of 3.5mm (50%). The left molar relationship was ⅔ unit Class II and the right ⅓ unit Class II. The left canine relationship was full unit Class II, and the right was ⅔ unit Class II. No crossbites were present.

The dental health component (DHC) of the Index of Orthodontic Treatment Need (IOTN) was 4a, and the aesthetic component (AC) was 9.

**Radiographic examination**

The DPT demonstrated that all third and second molars were developing. No other abnormalities were found.

The cephalometric analysis (Table 1) confirmed a skeletal Class II anterior-posterior discrepancy as demonstrated by an ANB of 5.8° and a Wits appraisal of 6.3mm. Both the upper and the lower incisors were severely proclined (134.7° upper & 104.5° lower), with the lower incisor in a relative normal position in relation to APo line (0.6 mm).

**Problem list**

1. Class II skeletal relationship due to mandibular retrognathia
2. Convex profile with reduced lower lip protrusion
3. Upper incisor proclination
4. Overjet of 8.5mm
5. Asymmetric Class II molar and canine relationship
6. 2 mm lower centerline discrepancy to the left of the upper dental midline
7. Incompetent lips at rest

**Aims and Objectives**

1. Utilize favorable mandibular growth for improvement of the Class II skeletal discrepancy
2. Improve facial harmony and increase lower lip protrusion
3. Reduce upper incisor proclination
4. Reduce overjet to normal values
5. Establish optimal buccal segment interdigitation bilaterally
6. Establish coincident centerlines
7. Obtain lip competence at rest
8. Maintain incisor display on smiling
9. Place teeth in a position conducive to favorable facial and dental esthetics and long-term stability
10. Retain corrected result

**Treatment plan**

1. Upper removable appliance while waiting for eruption of the upper second premolars and the growth spurt to occur. Appliance manufactured with an expansion screw to establish adequate maxillary dento-alveolar width to accomplish mandibular forward posturing without occlusal interferences from a crossbite tendency, with a ɔ-spring on the 12 to obtain initial alignment.
2. Andreassen's Activator appliance for mandibular growth stimulation with wax bite of approximately 5mm was given after the growth spurt was reached as evaluated by clinical examination. Cupping of lower incisors was done on the Activator to minimize lower incisor proclination.
3. Full upper and lower pre-adjusted edgewise fixed appliances (0.022” x 0.028” slot) with MBT prescription was placed after Class I canine was achieved with the Activator.
4. Bonded upper fixed retainer individually from UR3 to UL3 and upper vacuum formed retainer to be worn at night time only and a bonded lower fixed retainer individually from LR3 to LL3.

**Figure 1 (a-h) Case 1. Pre-treatment extra- and intra-oral photographs**

**Figure 2 (a,b) Case 1. Pre-treatment radiographs**

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CLINICAL 19
Class I canine relationship bilaterally and a waxbite thickness of 5mm (Figure 5). The compliance with the Activator was excellent, and after 5 months of wear the patient was ready for fixed appliances. A cephalogram after the Activator treatment was taken and analyzed (Figure 6). The cephalometric analysis (Table 2) revealed a skeletal Class I antero-posterior relationship (ANB 3.6°, Wits appraisal 2.8 mm). The SNA reduced during the use of the Activator, which was the cause for the reduction in the ANB angle. The SNB remained almost the same. The vertical proportions indicated a mildly anterior growth rotation. The upper incisors retroclined, and the lower incisors proclined after the Activator use. The upper incisors were severely proclined with 120.0°, and the lower incisors as well with 111.5°. The lower incisors protruded in relation to APo (5.2mm). 0.022 slot preadjusted edge-wire fixed appliances were placed, with the leveling and aligning phase initiated with 0.016” heat activated Nickel Titanium archwires in the upper and lower arches. The archwires progressed to 0.019 x 0.025” heat activated Nickel Titanium in the upper and lower arch, followed by customized and coordinated 0.019 x 0.025” stainless steel archwires with steel ligatures. At this stage the patient was advised to use Class II intermaxillary elastics (5/16” 3oz) bilaterally full time to correct our canine relationship after mild relapse occurred during the alignment and leveling phase of the fixed appliances. The intermaxillary elastics were continued for 4 months. During the torque expression of the rectangular steel wires, mild spaces opened in the upper arch, these spaces were closed with friction mechanics utilizing a closed elastomeric chain.

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*When used as directed. In vitro

Figure 5 (a-d). Case 1. Activator placed

Figure 6. Case 1. Cephalogram after Activator

Figure 7 (a-c). Case 1. Upper and lower MBT pre-adjusted edgewise appliances with 0.016” heat activated nickel titanium archwires

Figure 8 (a-c). Case 1. Upper and lower 0.019 x 0.025” stainless steel archwires with closed elastomeric chain for space closure from UR6 to UL6. Class II intermaxillary elastics bilaterally full time.

Figure 9 (a-c) Case 1. Post-treatment extra- and intra-oral photographs

Figure 10. Case 1. Mid-treatment to pre-finish superimposition.

Contact Information

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Table 1 Case 1. Pre-treatment cephalometric analysis

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<thead>
<tr>
<th>Variable</th>
<th>Pre-phase II</th>
<th>Normal</th>
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<tbody>
<tr>
<td>SNA (°)</td>
<td>79.3</td>
<td>82 (SD 3)</td>
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<tr>
<td>SNB (°)</td>
<td>73.9</td>
<td>79 (SD 3)</td>
</tr>
<tr>
<td>ANB (°)</td>
<td>5.8</td>
<td>3 (SD 1)</td>
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<tr>
<td>SN to maxillary plane angle (°)</td>
<td>134.7°</td>
<td>100 (SD 8)</td>
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<tr>
<td>Upper incisor to maxillary plane angle (°)</td>
<td>104.5°</td>
<td>92 (SD 5)</td>
</tr>
<tr>
<td>Interincisal angle (°)</td>
<td>101.3°</td>
<td>133 (SD 10)</td>
</tr>
<tr>
<td>Mandibular incisal plane angle (°)</td>
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<td>27 (SD 5)</td>
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<tr>
<td>Upper anterior face height (mm)</td>
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<td></td>
</tr>
<tr>
<td>Lower anterior face height (mm)</td>
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<td></td>
</tr>
<tr>
<td>Face height ratio (%)</td>
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<td>55</td>
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<tr>
<td>Lower incisor to APo line (mm)</td>
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<td>0 (SD 2)</td>
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<tr>
<td>Lower lip to Ricketts E Plane (mm)</td>
<td>-0.3 mm</td>
<td>-2 (SD 10)</td>
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Table 2 Case 1. Post-activator cephalometric analysis

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<th>Post-Retention</th>
<th>Normal</th>
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<tr>
<td>SNB (°)</td>
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<td>79 (SD 3)</td>
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<tr>
<td>ANB (°)</td>
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<td>3 (SD 1)</td>
<td>3 (SD 1)</td>
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<td>SN to maxillary plane angle (°)</td>
<td>134.7°</td>
<td>128.0 (SD 10)</td>
<td>100 (SD 8)</td>
<td>100 (SD 8)</td>
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<td>104.5°</td>
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<td>Interincisal angle (°)</td>
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<td>Upper anterior face height (mm)</td>
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<td>56.3</td>
<td>56.3</td>
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<tr>
<td>Lower anterior face height (mm)</td>
<td>54.6</td>
<td>54.6</td>
<td>54.6</td>
<td>54.6</td>
</tr>
<tr>
<td>Face height ratio (%)</td>
<td>59.4%</td>
<td>50.6%</td>
<td>50.6%</td>
<td>50.6%</td>
</tr>
<tr>
<td>Lower incisor to APo line (mm)</td>
<td>0.6 mm</td>
<td>3.2°</td>
<td>0 (SD 2)</td>
<td>0 (SD 2)</td>
</tr>
<tr>
<td>Lower lip to Ricketts E Plane (mm)</td>
<td>-0.3 mm</td>
<td>-2.1°</td>
<td>-2 (SD 10)</td>
<td>-2 (SD 10)</td>
</tr>
</tbody>
</table>

Table 3 Case 1. Post-treatment cephalometric analysis

*Denotes values greater than 1 standard deviation from the average Caucasian values.
**Denotes values greater than 2 standard deviation from the average Caucasian values.
***Denotes values greater than 3 standard deviation from the average Caucasian values.

Chain from upper right to left first molar.
A cephalogram was taken after correction of the anterior-proterior relationship to check the incisor inclinations and evaluate the patient for the possibility of extraction. The upper incisors were proclined, as was the lower incisors, however the lower incisors did not procline more than the pre-treatment value, and the facial appearance accepted the increased proclination. Therefore no ex-