The biteplate facebow:
a clinical and cephalometric study

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ABSTRACT

Introduction
The biteplate facebow includes a metallic occlusal plate that rests between the upper and lower incisors that is designed to correct the incisal overbite. The objective of this study is to evaluate the skeletal and dental effects of this appliance.

Patients and method
We chose thirty patients, sixteen boys and 14 girls, who had Class II malocclusions associated with a deep anterior overbite for this study. None of them had had teeth extracted as an adjunct to therapy. The only orthodontic appliance they wore was the facebow biteplate, for fourteen hours a day on the average, until their Class II molar relationship was corrected.

Results
After correction of the Class II molar relationship, we observed statistically significant before and after differences for both the incisal deep bite and the labial inclinations of the maxillary and mandibular incisors. We also noted skeletal changes at the close of treatment, notably of the mandibular plane and of point A, but they were not significant.

Conclusion
With this appliance, Class II Angle malocclusions with deep anterior overbites can be treated in a single stage, essentially by movements of teeth.

KEYWORDS
Facebow
Bite plate
Overbite
Class II.
1 - INTRODUCTION

The treatment of Angle Class II malocclusions began in the XIXth century when extra-oral appliances were first introduced. In 1865 Kingsley was one of the first orthodontists to use them. He was soon followed by other practitioners including Farrar, Keely, Angle, Jackson, Case. The Austrian Oppenheim pioneered the new era of the facebow in 1936 and in 1947 the American Kloehn reported on his use of the new appliance. In the 1960s, orthodontists first began to employ facebows associated with biteplates to distalyze the molars and simultaneously to relieve the anterior deep bite by intruding the maxillary incisors and/or the mandibular anteriors, according to the author’s interpretation of the process (after Langlade).

In view of the scant amount of information in the literature describing this appliance, we decided to evaluate its effects clinically and through a cephalometric analysis of patients with Class II malocclusions and deep anterior overbites.

2 - MATERIAL AND METHOD

2 -1 - Description the appliance

The facebow biteplate consists of an extra-oral arch and an intra-oral arch with an occlusal plate soldered to it (fig. 1).

The appliance is adjusted so that the intra-oral arch extends 3 mm in front of the incisal edges of the maxillary incisors. Different sizes of the appliance are available so that the orthodontist can select one that will be suited for the patient’s morphology and manner of buccal functioning. The extra-oral arch is inclined upward forming an angle of about 20° with the intra-oral arch. The extra-oral arch is hooked into the neckband with large elastic bands (fig. 2 and 3).
2 - 2 - Selection of patients

All of the patients participating in the study had been treated in our private practice between August 2004 and June 2005 for Class II Angle malocclusions of the brachyfacial or mesiofacial type and showed anterior overbite.

None of these patients had had preliminary orthopedic dento-facial therapy and they were all treated, without extractions, by the same practitioner. They wore no appliances other than the facebow biteplate, which they were asked to use an average of 14 hours per day. We eliminated two patients who did not comply with this instruction from the study.

Thirty patients, sixteen boys and 14 girls, were included. Their average age at the beginning of treatment was 12 years and six months and 13 years and 4 months at the time a Class I molar relationship was achieved. The average length of treatment was, accordingly, 10 months, plus or minus 2 months. We took a profile cephalogram of all patients at the beginning of treatment and another one when their first molars had reached a Class I Angle condition. The same operator, using the same X-ray machine, took all the films.

2 - 3 - Cephalometric analysis

We employed the Ricketts cephalometric analysis for study (table I and fig. 4).
AF (°)  Facial axis  Angle between lines Na-Ba and CC-Gn
PF (°)  Facial depth  Angle between Frankfort plane and line Na-Pog
FMA (°)  Mandibular plane / Frankfort plane  Angle between the mandibular plane and the Frankfort plane
HFI (°)  Lower facial height  Angle between lines Xi-anterior nasal spine and Xi-Pm
AM (°)  Mandibular arch  Angle between lines Xi-Pm and Xi-DC
HFT (°)  Total facial height  Angle between lines Na-Ba and Xi-Pm
Conv (°)  Convexity  Distance between point A and line Na-Pog
PM (°)  Maxillary depth  Angle between line Na-Point A and Frankfort plane
i/APog (mm)  Mandibular incisor / A-pogonion  Angle between axids of the mandibular incisor and line Point A-Pog
Distance between mandibular incisal edge and line Point A-Pog
6/PTV (mm)  1st maxillary molar / PTV  Distance between distal surface of 1st maxillary molar and line PTV
LI (mm)  Esthetic Line  Distance between Ricketts esthetic line and lower lip

| Points and planes used in the Ricketts cephalometric analysis. |

The same operator made all the tracings and all the measurements, checking them with the aid of another operator. We made supplementary measurements to this analysis (table II) that allowed us to visualize the palatal plane, the long axis of the maxillary central incisor, and the long axis of the first maxillary molar, as determined by a line connecting its mesio-buccal cusp with the apex of the mesio-buccal root as suggested by Piva.

We made our tracings and analyses with an indelible pen on tracing sheets, the before in black and the after in red.
evaluators when the t-test could not be employed. The Wilcoxon is a non-parametric test that is comparable to the Kruskal-Wallis test for two groups. Our null hypothesis was that the averages before and after wearing the face bow with biteplate were equal (p<0,05). It followed that in cases where p was greater than 0.05 for a variable, we could conclude that the before-after difference between the readings was statistically significant. The tests we employed, which are often used for clinical studies\cite{3,6,7,10,14,20,22}, are designed to allow for an evaluation of the importance of the results obtained in experiments working with small size samples like ours.

<table>
<thead>
<tr>
<th>SNA (°)</th>
<th>S-Na/Na-Point A</th>
<th>Angle between the S-Na plane and the line Na-Point A</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNB (°)</td>
<td>S-Na/Na-Point B</td>
<td>Angle between the S-Na plane and the line Na-Point B</td>
</tr>
<tr>
<td>ANB (°)</td>
<td>Na-Point A / Na-Point B</td>
<td>Angle between the lines Na-Point A and Na-Point B</td>
</tr>
<tr>
<td>PP/PF (°)</td>
<td>Palatal plane / Frankfort plane</td>
<td>Angle between the palatal plane and the Frankfort plane</td>
</tr>
<tr>
<td>Overbite (mm)</td>
<td>Incisal overbite</td>
<td>Projection of the incisal edges of the maxillary and the mandibular incisors on Na-Pog</td>
</tr>
<tr>
<td>i/PM (mm)</td>
<td>Mandibular incisor / mandibular plane</td>
<td>Distance between the incisal edges of the mandibular incisors and the mandibular plane</td>
</tr>
<tr>
<td>i/PP (°)</td>
<td>Maxillary incisor / palatal plane</td>
<td>Angle between the long axis of the maxillary central incisor and the palatal plane</td>
</tr>
<tr>
<td>i/PP (mm)</td>
<td>Distance between the incisal edge of the maxillary central incisor and the palatal plane</td>
<td></td>
</tr>
<tr>
<td>G/PP (°)</td>
<td>1st maxillary molar / palatal plane</td>
<td>Angle between the long axis of the 1st maxillary molar and the palatal plane</td>
</tr>
<tr>
<td>PO/PM (°)</td>
<td>Occlusal plane / mandibular plane</td>
<td>Angle between the occlusal plane and the mandibular plane</td>
</tr>
</tbody>
</table>

\textit{Table II}

The other points and planes used in the study.

\section*{2 - 4 - Statistical methods}

After having completed the cephalometric analyses, we calculated the averages and the standard deviations for each variable. When we analyzed the distribution of the variables, we found it to be normal. We then compared the averages using an analysis of variance and a Student t-test. We employed Bartlett’s Chi\cite{2} to test the inequality of variances: one p-value lower than 0.05 underlines the lack of homogeneity of the variances.

We utilized the Wilcoxon or the Mann-Whitney tests to confirm the t-test results or as substitute evaluators when the t-test could not be employed. The Wilcoxon is a non-parametric test that is comparable to the Kruskal-Wallis test for two groups. Our null hypothesis was that the averages before and after wearing the face bow with biteplate were equal (p<0,05). It followed that in cases where p was greater than 0.05 for a variable, we could conclude that the before-after difference between the readings was statistically significant. The tests we employed, which are often used for clinical studies\cite{3,6,7,10,14,20,22}, are designed to allow for an evaluation of the importance of the results obtained in experiments working with small size samples like ours.
3. RESULTS

The Over-all results are reported in table III. Five variables show statistically significant changes (p>0.05):
- The angle between the mandibular incisor and the line A-Pog (i/Apog) increased 1.13°;
- The incisal overbite decreased 3.37 mm;
- The angle between the long axis of the first maxillary molar and the palatal plane (6/PP) decreased 1.10°.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Before m. s.d.</th>
<th>After m. s.d.</th>
<th>Difference Af/Be</th>
<th>ANOVA</th>
<th>Chi²</th>
<th>Wilcoxon</th>
</tr>
</thead>
<tbody>
<tr>
<td>AF (°)</td>
<td>88.27 4.41</td>
<td>87.37 4.76</td>
<td>-0.90</td>
<td>0.00</td>
<td>0.50</td>
<td>0.01</td>
</tr>
<tr>
<td>PF (°)</td>
<td>88.33 2.94</td>
<td>88.67 3.23</td>
<td>0.33</td>
<td>0.00</td>
<td>0.26</td>
<td>0.02</td>
</tr>
<tr>
<td>FMA (°)</td>
<td>21.13 5.50</td>
<td>21.87 5.31</td>
<td>0.73</td>
<td>0.00</td>
<td>0.80</td>
<td>0.02</td>
</tr>
<tr>
<td>HFI (°)</td>
<td>41.13 4.07</td>
<td>42.87 4.18</td>
<td>1.73</td>
<td>0.00</td>
<td>0.27</td>
<td>0.01</td>
</tr>
<tr>
<td>HFT (°)</td>
<td>56.87 5.28</td>
<td>57.77 5.46</td>
<td>0.90</td>
<td>0.00</td>
<td>0.82</td>
<td>0.05</td>
</tr>
<tr>
<td>AM (°)</td>
<td>34.93 4.32</td>
<td>35.40 4.86</td>
<td>0.47</td>
<td>0.00</td>
<td>0.00</td>
<td>0.02</td>
</tr>
<tr>
<td>Conv (mm)</td>
<td>4.17 2.84</td>
<td>3.37 2.88</td>
<td>-0.80</td>
<td>0.00</td>
<td>1.00</td>
<td>0.00</td>
</tr>
<tr>
<td>PM (°)</td>
<td>91.60 2.61</td>
<td>90.73 2.78</td>
<td>-0.87</td>
<td>0.00</td>
<td>0.68</td>
<td>0.00</td>
</tr>
<tr>
<td>i/Apog (°)</td>
<td>22.33 5.02</td>
<td>23.47 4.96</td>
<td>1.13</td>
<td>0.46</td>
<td>0.00</td>
<td>0.5632*</td>
</tr>
<tr>
<td>i/Apog (mm)</td>
<td>0.37 2.13</td>
<td>0.80 2.62</td>
<td>0.43</td>
<td>0.00</td>
<td>0.05</td>
<td>0.00</td>
</tr>
<tr>
<td>6/PTV (mm)</td>
<td>15.40 4.21</td>
<td>13.93 4.42</td>
<td>-1.47</td>
<td>0.00</td>
<td>0.72</td>
<td>0.03</td>
</tr>
<tr>
<td>Li (mm)</td>
<td>-1.77 3.33</td>
<td>-2.27 3.23</td>
<td>-0.50</td>
<td>0.00</td>
<td>0.10</td>
<td>0.02</td>
</tr>
<tr>
<td>SNA (°)</td>
<td>82.10 3.78</td>
<td>81.50 4.04</td>
<td>-0.60</td>
<td>0.00</td>
<td>0.14</td>
<td>0.018</td>
</tr>
<tr>
<td>SNB (°)</td>
<td>77.33 3.67</td>
<td>77.57 3.99</td>
<td>0.23</td>
<td>0.00</td>
<td>0.83</td>
<td>0.015</td>
</tr>
<tr>
<td>ANB (°)</td>
<td>4.77 2.50</td>
<td>3.93 2.64</td>
<td>-0.83</td>
<td>0.00</td>
<td>0.71</td>
<td>0.003</td>
</tr>
<tr>
<td>PP/PF (°)</td>
<td>2.07 3.36</td>
<td>1.60 3.59</td>
<td>-0.47</td>
<td>0.00</td>
<td>0.16</td>
<td>0.01</td>
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<tr>
<td>Overbite (mm)</td>
<td>6.42 1.35</td>
<td>3.05 1.85</td>
<td>-3.37</td>
<td>0.28</td>
<td>0.01</td>
<td>0.3351*</td>
</tr>
<tr>
<td>i/PM (mm)</td>
<td>41.93 3.08</td>
<td>42.47 2.98</td>
<td>0.53</td>
<td>0.00</td>
<td>0.94</td>
<td>0.00</td>
</tr>
<tr>
<td>i/PP (°)</td>
<td>108.13 5.86</td>
<td>114.13 7.21</td>
<td>6.00</td>
<td>0.22</td>
<td>0.00</td>
<td>0.2916*</td>
</tr>
<tr>
<td>i/PP (mm)</td>
<td>29.87 2.54</td>
<td>28.40 2.57</td>
<td>-1.47</td>
<td>0.00</td>
<td>0.08</td>
<td>0.01</td>
</tr>
<tr>
<td>6/PP (°)</td>
<td>78.67 4.31</td>
<td>79.77 5.22</td>
<td>1.10</td>
<td>0.06</td>
<td>0.00</td>
<td>0.1259*</td>
</tr>
<tr>
<td>PQ/PM (°)</td>
<td>12.67 3.40</td>
<td>14.30 3.22</td>
<td>1.63</td>
<td>0.09</td>
<td>0.00</td>
<td>0.2943*</td>
</tr>
</tbody>
</table>

Table III
Before and after, demonstrating results obtained in treatment (*P>0.05).
– The inclination of the functional occlusal plane increased 1.63° with respect to the mandibular plane (PO/PM).

The other variables did not display any statistically significant changes but we did observe that on the average:

– the facial axis (FA) decreased 0.90°;
– the facial depth (FD) increased 0.33°;
– the angle between the mandibular plane and the Frankfort plane (FMA) increased 0.67°;
– lower facial height (LFH) increased 1.73° and total facial height (TFH) increased 0.90°;
– the mandibular arch (MA) opened 0.47°;
– point A (Conv) moved distally 0.80 mm with respect to the Na-Pog line;
– maxillary depth (MD) decreased 0.87°;
– the distance between the incisal edge of the mandibular incisor and the A-Pog line (i/Apog) increased 0.43 mm and the distance between this incisal edge and the mandibular plane (i/PM) increased 0.53 mm;
– the crown of the first maxillary molar (6/PTV) moved distally 1.47 mm;
– SNA decreased 0.60°;
– SNB increased 0.23°;
– ANB decreased 0.83°;
– the angle between the palatal plane and the Frankfort plane (PP/FP) decreased 0.47°;
– the distance between the incisal edge of the upper central incisor and the palatal plane (i/PP) decreased 1.47 mm.

4 - DISCUSSION

4 - 1 - Skeletal effects

The facial axis (AF) decreased 0.9° (fig. 5) on the average in contrast to its usual behavior of remaining stable during natural growth in untreated children (Lejoyeux18, Langlade17). In studies similar to ours, Chabert6 and Bacon1 both noted a decrease in the facial axis of 1.5° and 1.7°, respectively, while Sauer32 noted an increase in this angle of 0.3°. From this range of data, we conclude that the appliance we used caused a modest change in this angle.

Facial depth (PF) increased 0.33°; this variation is comparable to the variations that occur during natural growth (Langlade17, Riolo31). We believe that our therapy had very little effect on facial depth.

The angle between the mandibular plane and the Frankfort plane (FMA) increased 0.67° while the studies of Langlade17 and Riolo31 show that it decreases in natural growth. Gesch8, Kim13, Phan25 and You35 found identical variations in untreated patients with Class II, division 1 malocclusions. McNamara22, Melsen23 and Ricketts30 obtained results similar to ours in their treatment of Class II patients by means of standard cervical extra-oral headgear. Our therapy caused a slight posterior rotation of the mandible (fig. 5).

Lower facial height (HFI) increased 1.70° (fig. 6) in the patients in our study while it remains stable during natural growth6,17. Chabert6 and Sauer32 noted the same effect in their studies. Total facial height (HFT),
which remains stable in natural growth (Béry2), increased 0.90° during treatment. This therapeutic effect is also found when extra-oral force is used without a biteplate. The two variations are probably correlated to a slight posterior rotation of the mandible and, to a lesser extent, to a tilting of the maxilla.

The mandibular arch (AM) opened 0.47° (fig. 6), which is the same order of change that occurs in natural growth (Chabert6, Langlade17).

Convexity (conv) decreased 0.8 mm during treatment (fig. 5). Point A usually moves distally in natural growth (Langlade37, Riolo31) but seems to move forward in Class II malocclusions3,7,14,19,22,23,30. Other studies have shown an inhibition of maxillary growth in patients treated with cervical extra oral force. Our therapy did seem to influence the position of point A, causing it to move distally.

Maxillary depth (PM) decreased 0.87°, which is probably associated with the retreat of point A (fig. 5). According to Riolo31, this angle normally increases with age in girls (0.6° per year between the ages of 10 to 14) and remains stable in boys until they reach the age of 13 when this angle decreases 0.8° and then increases later. You35 demonstrated an average increase of 1.69° of this measurement between the ages of 9 to 18 years in untreated patients with Class II malocclusions. Sauer32 reported an average increase of this angle of 0.4° during treatment, demonstrating the extra oral force’s inhibiting action on the advance of point A. In the same way, the face bow with a biteplate not only prevented forward movement of point A but also actually moved it backward.
The SNA angle decreased 0.6° in our study. According to Riolo\textsuperscript{31}, this angle increases during natural growth in boys between the ages of 12 to 13 and decreases 0.4° in girls during the same period. Patients with untreated Class II, division 1 malocclusions had an increase of this angle between the ages of 8 to 12 according to Bishara\textsuperscript{4}, between 12 to 14 according to, Phan\textsuperscript{25}, between 11 to 13 according to Lux\textsuperscript{20}, between 9 to 12 according to Ramos\textsuperscript{29}, and between 10 and 12 according to Müller (cited by Gesch\textsuperscript{8}) and Gesch\textsuperscript{8}. Lux\textsuperscript{20} noted the same changes in patients with untreated Class II, division 2 malocclusions. Studies focused on patients who wore tradition extra-oral arches\textsuperscript{3,11,14,19,25,33} also reported a reduction of the value of the SNA angle ranging from 0.6° to 3°. Sauer\textsuperscript{32}, who used extra oral force with a biteplate obtained results similar to ours (0.3°). Our appliance confirmed the therapeutic effect he reported of a retreat of point A.

We observed a slight increase of the SNB angle of 0.23°, which, according to Riolo\textsuperscript{31} continues to increase during the course of natural growth. Studies dealing with patients with untreated Class II malocclusions derived the same findings\textsuperscript{4,8,20,25,29}. Sauer\textsuperscript{32} found the same tendency. All this data suggests our appliance had no effect on the advancement of point B.

We noted a decrease in ANB of 0.83° in both girls and boys. Riolo\textsuperscript{31} reported an average decrease of this angle of 0.2° in the natural growth of children 12 to 13 years of age. Some authors, Phan\textsuperscript{25}, Ramos\textsuperscript{29}, Müller and Janson cited by Gesch\textsuperscript{8}, Gesch\textsuperscript{8}, and Lux\textsuperscript{20} have observed a decrease in this angle with natural growth in children with untreated Class II malocclusions; but Bishara\textsuperscript{4} found an increase in boy and a decrease in girls. You\textsuperscript{35} noted a decrease in this angle of 1.03° in untreated children between 8 and 18 with Class II, division 1 malocclusions. Sauer\textsuperscript{32} obtained an average decrease of this angle of 1°. This phenomenon is probably associated with a decrease in angle SNA and a slight increase in SNB, from which information we can deduce that our therapy had an indirect effect on this parameter.

The palatal lane (PP/PF) tipped in a clockwise direction, which confirms the results of Chabert\textsuperscript{6} and Sauer\textsuperscript{32} (fig. 5). This plane descends parallel to itself in the course of natural growth\textsuperscript{17}. For untreated children with Class II, division 1 malocclusions, Mäntysaari\textsuperscript{21} observed that the plane was stable but Kim\textsuperscript{13} and Dubois\textsuperscript{7} stated that it rotated counter-clockwise. On the other hand, many studies devoted to patients with Class II, division 1 malocclusions treated with cervical extra-oral force assert that the maxilla rotated in a clockwise direction\textsuperscript{10,11,13,14,19,27}. Because of the weak variation, 0.47°, in this variable our findings, we cannot attribute this movement to the action of our appliance.

4 - 2 - Behavior of the functional plane of occlusion

The angle between the functional plane of occlusion and the mandibular plane increased a statistically significant average of 1.63°, rising from 12.67° to 14.3°, which reflects a counter-clockwise tilting of the functional plane of occlusion (fig. 6). In her
study, Kuntz\textsuperscript{16} reported that the average value of this angle was 15.3° in patients who had a Class I occlusion and 13.5° in patients with Class II, division 1 malocclusions. Our therapy tended to provide treated patients with an orientation of the functional plane of occlusion close to that found in Class I patients.

4 - 3 - Dento-alveolar effects

We observed a statistically significant labial inclination of the mandibular central incisor (\(i/Apog\)), which was clearly a reaction to the orthodontic action of the appliance (fig. 6) because in the absence of treatment the inclination of this tooth is stable during the growth period\textsuperscript{17,31}. We also noted that the distance between the incisal edge of this tooth and the mandibular plane (\(i/PM\)) increase and average of 0.53 mm, 0.44 mm for boys and 0.64 mm for girls. According to Riolo\textsuperscript{31}, this measurement increases 1 mm per year between the ages of 10 to 15 in boys and 0.5 mm per year between 10 and 12 years and 1 mm from 12 to 13 in girls during natural growth. The smaller augmentation of the distance between the incisal edge and the mandibular plane occurring in our study would result from its labial tilting and an inhibition of its extrusion.

We found that the incisal overbite was reduced a statistically significant 3.37 mm. In untreated Class II, division 1 patients Bishara\textsuperscript{4}, Mäntysaari\textsuperscript{21} and You\textsuperscript{35} reported that the overbite increased, Kim\textsuperscript{13} asserted that it remained stable, and Phan\textsuperscript{25} derived data that demonstrated a decrease. Bondemark\textsuperscript{5} noted a 0.70 mm decrease in overbite in patients treated with extra-oral force without a biteplate. Sauer\textsuperscript{32} also obtained a statistically significant decrease of overbite in a study similar to ours. The considerable improvement in overbite that we achieved would clearly seem to be caused by the effect of the extra-oral force and the biteplate, which also, at least in part, provoke the buccal tilting of the incisors and the slight posterior rotation of the mandible.

Our data show a statistically significant buccal inclination of the maxillary central incisor (\(i/PP\)) of 6° (fig. 8 and 9). In natural growth, according to Riolo\textsuperscript{31} and You\textsuperscript{35}, this tooth remains stable and un-tilted. We noted a decrease in the distance between the incisal edge of the maxillary central incisor and the palatal plane of 1.47 mm while this distance increases in natural growth (Riolo\textsuperscript{31}). It appeared that the biteplate induced a buccal tilting of this tooth that was accompanied by a moderate intrusion of this tooth.

The long axis of the maxillary first molar (\(6/PP\)) rotated a statistically significant 1.1° (fig. 8), a movement that was associated with the inclinaison of the extra-oral arch of the facebow. This result confirmed the data reported in the literature\textsuperscript{9,11,12,23,34}. We noted that the first maxillary molar of our patients moved distally (\(6/PTV\)). However, in the course of undisturbed natural growth, this tooth migrates mesially 1 mm per year according to Langlade\textsuperscript{17}; other researchers have reported the same process in untreated patients who had Class II malocclusions\textsuperscript{5,28,35}. Other authors whose patients wore cervical headgear without a biteplate have reported results similar to ours\textsuperscript{5,9,12,23,31,34}. So it can be concluded that extra-oral force, employed with or without a biteplate, stimulates distal movement of the first maxillary molar (fig. 6, 7, 8, 9).
4 - 4 - Perspectives

From the results of this study, we can conclude that extra-oral force delivered from cervical anchorage in association with a biteplate is an effective apparatus for correcting both a Class II molar relationship and an incisal overbite. Overall, we found in analyzing our results that we achieved effects similar to those gained in traditional cervical extra-oral treatment such as closing of the facial axis, posterior rotation of the mandible, and distal movement of point A. Dentally, we observed a distalization of the upper first molar similar to what has been reported in studies of traditional treatment and, in addition, we obtained a correction of the incisal overbite thanks to the action of the biteplate.

The opening of the bite allowed us, in a second stage of treatment to immediately install a full-banded appliance on most of the patients who had benefited from the facebow bite plate therapy (fig. 10), a procedure that is less often possible for patients who received extra-oral traction without a biteplate and, accordingly, had no reduction of the anterior deep bite.
**Figure 8**
Local superimposition of the maxilla on the palatal plane centered on the anterior nasal spine. This gives a good view of the labial tipping of the maxillary central incisor, and the distal movement and mesial inclination of the upper first molar.

**Figures 9 a to d**

*a and b: initial clinical condition;*  
*c and d: clinical status at the end of wearing extra-oral force: the maxillary first molars are in Class I, the overbite has been eliminated, and the maxillary central incisors have been tipped labially.*
5 - CONCLUSION

We made a cephalometric evaluation of the changes produced by the wearing of cervical extra-oral force with a biteplate in thirty patients who had begun treatment with a Class II malocclusion and anterior overbite.

The skeletal effects we obtained, such as the distal movement of point A,
the decrease in convexity, the increase in facial height or the posterior rotation of the mandible, conformed to the results reported by the majority of authors. The same was true of the distal movement of the first maxillary molar.5, 9, 12, 23, 30, 34.

But, in addition, we also obtained important changes of the incisors. We observed a statistically significant reduction of the anterior overbite, which resulted from a statistically significant labial tipping of the incisors and also from the intrusion force of the biteplate component of our appliance.

The facebow with biteplate can, therefore, be considered a reliable appliance for the correction of a Class II molar relationship as well as for eliminating an anterior overbite. It certainly seems indicated for the treatment of Class II Angle malocclusions of the brachyfacial or mesiofacial type associated with a deep anterior overbite.

REFERENCES

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