Orthodontics

EVALUATING SKELETAL CHANGES IN TREATMENT OF ANTERIOR OPEN BITE WITH ACCENTUATED CURVE NITI Wires

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ABSTRACT

The treatment of anterior open bite has proven to be a nightmare and one of the most challenging aspects of orthodontics. In this study we tried to treat anterior open bite patients with a combination of incisor extrusion and molar intrusion. The study group included 22 patients with a mean age of 17.6 years. After the initial leveling and alignment 0.016" x 0.022" accentuated curve NiTi arch wires were placed with anterior box elastics. Average treatment completion time was 18 months followed by retention. The purpose of the study was to evaluate skeletal changes taking place due to the effect of accentuated curve NiTi wires with anterior box elastics in anterior open bite patients.

Key words: Reverse curve arches, box elastics, incisor overlap.

INTRODUCTION

Anterior open bite is the lack of vertical overlap of the anterior teeth in centric occlusion.1,2 Anterior open bite can be classified into skeletal and dental open bite. Skeletal open bite presents with excessive vertical dimensions and clockwise rotation of the mandible, while dental open bite are usually caused by obstruction in the eruption of anterior teeth.3,4

The etiology of any type of malocclusion is a combination of genetic and environmental factors. Although the genetic component of skeletal open bites is not well understood, the environmental factors that may contribute to this malocclusion have been reported extensively.5-10

Open bite may be dental or skeletal, but any kind is difficult to treat. Skeletal type being more challenging. Different treatment modalities include habit breaking appliances,11,12 incisor extrusion, molar intrusion13, extractions for bite closure, use of functional appliances14 and surgical correction.15

In our study we tried to treat such cases with a combination of incisor extrusion and molar intrusion.

METHODOLOGY

Our study group consisted of 22 patients seeking orthodontic treatment at Dental Centre, Islamabad.

The sample consisted of 22 patients (10 females and 12 males). Age ranged from 12 to 25 years with an average of 17.6 years. All cases had a class I high angle skeletal pattern (SN-GoMe > 38°), with clockwise rotation of the mandible and a class I dental relationship with an anterior open bite that ranged between 0 mm and 4 mm with the average being 1.93 mm.

After collecting the initial records, bands and brackets (0.022" slot-Roth prescription, Turbo Twin Ortho Technology, USA) were placed. Initial leveling and alignment was obtained in 4 months and then 0.016 x 0.022" accentuated curve Ni Ti arches (Falcon Orthodontics, Ultimax) (Figs1,2,3) were placed with anterior elastics on canines for 2 months followed by
Fig 1 (a). Side view of wires showing the effect on anterior teeth.
Fig 1 (b). Frontal view of wires in active form.
Fig 1 (c). Side view of wires showing the effect on posterior segment.

Fig 2: Pretreatment intra-oral frontal, right side, and left side photographs

Fig 3. Intra-oral frontal, right side, and left side photographs after 10 months of treatment.
Evaluating Skeletal Changes in Treatment of Anterior open Bite

anterior box elastics for 4 months. An average treatment completion time was 18 months, followed by a one year retention phase with elastic bite blocks.

Pretreatment and post treatment lateral cephalograms were traced and some skeletal (SNA, SNB, ANB, N-Me, ANS-Me) measurements (Fig 4) were compared and analyzed with Wilcoxon signed rank test using SPSS for MS Windows. Dahlberg’s method was used for the calculation of the operator’s error.

### TABLE 1. SKELETAL CHANGES BEFORE & AFTER TREATMENT

<table>
<thead>
<tr>
<th></th>
<th>Before x</th>
<th>sd</th>
<th>After x</th>
<th>sd</th>
<th>Wilcoxon P-Value</th>
<th>Sig.</th>
</tr>
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<tbody>
<tr>
<td>SNA</td>
<td>82.57</td>
<td>3.28</td>
<td>82.35</td>
<td>3.42</td>
<td>.976</td>
<td></td>
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<tr>
<td>SNB</td>
<td>79.33</td>
<td>3.05</td>
<td>79.40</td>
<td>2.98</td>
<td>.691</td>
<td></td>
</tr>
<tr>
<td>ANB</td>
<td>3.35</td>
<td>3.18</td>
<td>2.98</td>
<td>2.96</td>
<td>.589</td>
<td></td>
</tr>
<tr>
<td>Go°</td>
<td>131.53</td>
<td>6.93</td>
<td>131.97</td>
<td>6.65</td>
<td>.722</td>
<td></td>
</tr>
<tr>
<td>SN-Occ</td>
<td>79.67</td>
<td>3.24</td>
<td>79.00</td>
<td>3.81</td>
<td>.316</td>
<td></td>
</tr>
<tr>
<td>N-ME</td>
<td>118.55</td>
<td>4.13</td>
<td>120.33</td>
<td>4.65</td>
<td>.034 *</td>
<td></td>
</tr>
<tr>
<td>ANS-Me</td>
<td>67.24</td>
<td>4.65</td>
<td>69.82</td>
<td>4.72</td>
<td>.005 **</td>
<td></td>
</tr>
</tbody>
</table>

*p< .05, **p< .01

### RESULTS

Results of skeletal changes evaluated on pre and post treatment lateral cephalograms are (Table 1):

1- N-Me increased significantly.
2- ANS-Me increased significantly.
3- SNA° didn’t change and this was considered insignificant.
4- SNB° increased insignificantly.
5- ANB° reduced insignificantly.
6- Gonial angle increased insignificantly.

### DISCUSSION

In the morphology of open bite maxillary posterior excess and backward rotation of the mandible are the most important problems. True treatment of the situation aims to intrude the maxillary posterior dentition, achieve mandibular counter clock wise rotation and close the bite.

Inspired by Kim’s technique for open bite closure, Enacar et al, designed a treatment modality which included the use of upper accentuated curve and lower reverse curve Ni Ti arches. The philosophy of these arches is to perform intrusive force to both anterior and posterior dentoalveolar segments in the maxilla and mandible. The vertical intercanine elastics are applied to balance the anterior intrusive force of the arches. While the anterior intrusive force is balanced, the posterior intrusive force will be active in intruding the posteriors. This intrusive force will be active in intruding the posterior dentoalveolar segments in both
maxilla and mandible, so the anterior rotation of the mandible and closure of open bite will take place.

In the previous studies with these arches, adult patients were used and open bite was closed by more incisor extrusion rather than molar intrusion.\(^{17,20}\)

In this study our aim was to evaluate skeletal changes taking place due to the effects of these arches, and to see whether it was possible to achieve skeletal effects.

The results clearly demonstrate that there has been no significant skeletal change, other than the change in anterior facial height. This change in the anterior facial height can well be because of extrusion of the posterior dental segment.

**CONCLUSION**

Treatment of anterior open bite with accentuated curve NiTi wires and anterior box elastics has shown to be an effective and efficient method, as a result of treatment, the overbite increased an average of 3.23 mm. The skeletal changes occurring with this treatment protocol have been insignificant except the lower anterior facial height, which increased significantly. However this increase in facial height can be a cause of molar extrusions. Therefore a future evaluation of dental changes in these cases in strongly suggested.

**REFERENCES**