EVALUATING DENTAL 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 challenge in orthodontics. In this study we tried to treat anterior open bite patients with a combination of incisor extrusion and molar intrusion. The purpose of the study was to evaluate dental changes taking place due to the effect of accentuated curve NiTi wires with anterior box elastics in anterior open bite patients. The results clearly demonstrate that there has been significant dentoalveolar change. This study confirms that the molars uprighted significantly rather than molar intrusion along with incisor extrusion.

Key words: Reverse curve arches, incisor extrusion, molar extrusion.

INTRODUCTION

Anterior open bite has been defined as the absence of contact between maxillary and mandibular incisors at centric relation.1,2 It 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 is usually caused by obstruction in the eruption of anterior teeth.3,4

The cause of open bite is often multi-factorial. Etiologic factors most often cited in the literature include “open bite skeletal pattern,” vertical maxillary excess, abnormalities in dental eruption, and tongue posture problems. Anterior open bite might also be a result of increased axial inclination of maxillary and mandibular incisors. The treatment of any particular open bite problem naturally would be dependent on the particular problem list evolved with the assessment of each individual patient.5-10

Open bite may be dental or skeletal, but any kind is difficult to treat. Different treatment modalities include habit breaking appliances11,12, incisor extrusion, molar intrusion13, extractions for bite closure, use of functional appliances14 and surgical correction.15 In this 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) (Figs 1,2,3) were placed with anterior elastics on canines for 2 months followed by anterior box elastics for 4 months. An average treatment completion time was 18 months,

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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.
followed by a one year retention phase with elastic bite blocks.

Pretreatment and post treatment lateral cephalograms were traced and some dental measurements (Figs 4, 5) 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.

RESULTS

Results of dental changes evaluated on pre and post treatment lateral cephalograms are (Figs 4, 5 & 6) & (Table 1):

Upper incisors extruded and uprighted significantly

Upper first premolars extruded and uprighted significantly

Upper first molars uprighted significantly and extruded insignificantly

Lower incisors extruded and uprighted significantly

Lower first premolars extruded and uprighted significantly

Lower first molars uprighted significantly and extruded insignificantly

Functional occlusal plane rotated counter clockwise significantly

Overbite increased significantly, while overjet decreased significantly

1=U1-HA
2=U41-HA
3=U6-HA
4=L1-MP
5=L4-MP
6=L6-MP
7=U1-VB
8=U6-VB
9=L1-VB
10=L6-VB
Evaluating Dental Changes in Treatment of Anterior Open Bite

DISCUSSION

Open bite is one of the difficult malocclusions to treat and maintain the treatment results. In the morphology of open bite maxillary posterior excess and clockwise rotation of the mandible are the most important tribulations. True treatment of the situation aims to intrude the maxillary posterior dentition, achieve mandibular counter clockwise rotation and close the bite.

Inspired by Kim’s technique for open bite closure, Enacar et al 16, 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 inter-canine 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 general the objective of treatment for an anterior open bite malocclusion should be the creation of an overlapping relationship. The position of the maxillary central incisors relative to the lip line must be at or near the 4mm norm as measured cephalometrically. The maxillary central incisor edges, therefore, should be the guide for the anterior limit of the upper occlusal plane.

The lower occlusal plane should then follow the upper so that there is a sufficient overlap between the maxillary and mandibular incisors. However, because the vertical level of the occlusal plane in the posterior segment is determined by the physiology, anatomy, and function of the surrounding structures, it cannot be altered readily.

In any malocclusion, the axial inclination of each component of the entire dentition is important. Especially in open bite cases, the inclination is characteristically mesial. The greater the openness of the occlusal planes, the greater the inclination of the dentitions to the bisected occlusal plane.

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<th>TABLE 1: DENTAL CHANGES BEFORE &amp; AFTER TREATMENT</th>
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*p<.05, **p<.01***p<.001
In this study our aim was to evaluate dental changes taking place due to the effects of these arches, and to see whether it was possible to intrude the posterior segment.

The results of our study indicated that bite closure had been achieved to a great extent by up righting and extrusion of the lower incisor and upper incisors. Elastics, which were applied to prevent incisor intrusion as a result of NiTi arch wires, caused extrusion and up righting of the incisors. The 2.00 mm extrusion (P<0.01) measured in the upper incisors was in part due to the change in the relative distance of the incisor tip to the true horizontal plane “HA” that took place as the central incisor was being uprighted (5.38Ú) and this was also significant (P<0.01).

Although the configuration of the arch wires in the molar region forced the molars to be both intruded and uprighted, no molar intrusion took place. Instead, the molars were uprighted and slightly extruded. Extrusion of molars is an undesirable treatment effect in the group of patients that formed our study sample. However, the amount of lower molar extrusion in the present study was minimal (0.33 mm), and it may have been related to the selection of mesiobuccal cusp tip of the first molar as a landmark for linear measurements.

The results clearly demonstrate that there has been significant dental change. Our previous study on skeletal effects of such treatment on the same subjects showed an increase in the anterior facial height. This study confirms that there has been extrusion of the posterior segment rather than intrusion, which justifies that the increase in the anterior facial height was because of extrusion of the posterior dental segment.

CONCLUSION

The treatment changes mainly occurred in the dentoalveolar region. The upper accentuated and lower reverse curve therapy was shown to be an effective and efficient method to treat open bite malocclusion. As a result of treatment, the overbite increased an average of 3.23mm. The treatment changes were an alteration of the functional occlusal plane in a counter clock wise direction accompanied by the up righting of the posterior teeth. Both upper and lower incisors were uprighted and extruded. No molar intrusion was achieved, both upper and lower molars slightly extruded and uprighted.

REFERENCES
