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Modified Kims method for open bite correction

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ABSTRACT
Anterior open bite is defined as a condition in which upper incisor crowns fail to overlap the incisal third of the lower incisor crowns when the mandible is brought into full occlusion. The diagnosis, treatment, and successful retention of treated open-bite malocclusion continue to be a constant subject of discussion and study, contributing to the frustrations of clinicians. Various modalities have been used for correction of open bite for different age group. In adult cases, open bite can be corrected either by anterior extrusion or posterior intrusion or combination of both. Kim had described a method of using multiloop edgewise archwire (MEAW) for posterior intrusion. Here's a case report in which an innovative method is described which is a modification of Kim's method which is simpler, less time-consuming to place, hygienic and they do not irritate the soft tissue. The bite closing mechanism and the treatment results similar to Kim's method

KEYWORDS: Open bite, Skeletal open bite, Reverse curve niti, Box elastic, Posterior intrusion

I. INTRODUCTION

Anterior open bite is defined as a condition in which upper incisor crowns fail to overlap the incisal third of the lower incisor crowns when the mandible is brought into full occlusion. Within the limits of this definition, the degree or severity of malocclusion may vary from a mild edge to edge relationship of the incisor teeth to a severe and handicapping malocclusion.1

The diagnosis, treatment and successful retention of treated open bite malocclusion continue to be a constant subject of discussion and study, contributing to the frustrations of clinicians. Studies related to the etiology, incidence, classification, characteristics, and treatment of this dysplasia have implicated many potential etiologic factors, including unfavourable growth patterns,1,2-4 digit-sucking habits,2,4,5-9heredity,1,6 lymphatic tissue,7-10 tongue and orofacial muscle activity,11 orofacial functional matrices,12mental retardation,7 and imbalances between jaw posture, occlusal and eruptive force and head position.13

Treatment of open bite is complicated by the difficulty of differentiating among many possible dentoalveolar and skeletal etiologic factors, depending on the patient's growth pattern.14 Cephalometric measurements such as the mandibular plane angle, upper-to-lower facial-height ratio, and anterior-to-posterior facial-height ratio have been used to identify vertical discrepancies, but these measurements do not always predict the treatment response and stability of an open bite malocclusion.15,16 The Overbite Depth Indicator (ODI) proposed by Kim17 can be helpful in determining the skeletal pattern. ODI is the arithmetic sum of the angle of the AB plane to the mandibular plane and the angle of the palatal plane to Frankfort horizontal. The norm is 74°± 6.07; a value of 68° or less indicates a skeletal open-bite tendency.17

Open bite will sometimes correct spontaneously after the elimination of detrimental habits in the early mixed dentition. Some of the treatment modalities are interceptive orthodontics treatment by using removable Hawley appliance with screening device and habit breaker, tongue crib followed by phase II treatment, Haas Appliance which is followed by Hawley Retainer with Tongue Guard for Stability (retention) after which phase II treatment follows, fixed orthodontic therapy with anterior elastics, and orthognathic surgery.18 A successful non-surgical treatment for an adolescent female presented with Angle Class III malocclusion, excessive lower facial height and anterior open bite has been reported in previous studies. The patient refused the orthosurgical treatment modality and another option was suggested using multiloop edgewise archwire (MEAW) in association with a chincup to correct the divergence of occlusal planes, molar relationship, without major change of the patient's profile.19

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Whatever form of treatment is chosen, goals should include correcting the inclination of the occlusal planes, aligning the maxillary incisors relative to the lip line, and uprighting the axial

Appliance design

The appliance is modification of Multi-loop edgewise archwire (MEAW) technique introduced by Charles Tweed.17The multiple loops were replaced by reverse curve of spee in lower arch and exaggerated curve of spee in upper arch. Enacar20 et al gave a modification by placing reverse curve in both arches along with very heavy class II elastics. In our study we have used 17x25 reverse curve niti arch wire with posterior box elatic. The posterior box was given in class II pattern.

Case report

23 year old female came to the department with the chief complaint of forwardly placed upper front teeth. The patient cited esthetics as the main reason for desiring orthodontic treatment. Patient had no relevant dental and medical history. Siblings and parents of the patient did not have similar malocclusion, confirming that there was no hereditary component responsible for the patient's malocclusion.

On extra oral examination, she had a mesocephalic, mesoproscopic face, a convex profile, anterior divergence and incompetent lips. The patient displayed a non-consonant smile arc and upturned nose in profile view. There was no history of respiratory problems. On functional examination it was found that patient has a tongue thrusting habit. Intraoral examination revealed anterior open bite of 6mm with Angle's class I molar relation bilaterally. Intraoral examination also showed upper and lower anterior spacing. (Figure 1)

FIGURE 1- PRE-TREATMENT PHOTOGRAPH

inclinations of the posterior teeth. This article presents a modification of MBT technique, using 0.017×0.025 reverse curve nitiarchwire in upper and lower arch and posterior box elastics.

Tongue size was normal as no lateral indentations were present on the lateral aspect of tongue. The cephalometric tracing confirmed that the patient had a moderate Class II skeletal pattern with ANB value of 4 degrees. The patient had average growth pattern and proclined maxillary and mandibular incisors. COGs dental analysis revealed intrusion of incisors and extrusion of posterior teeth confirming diverging maxillary and mandibular occlusal planes. The objectives of the treatment were to eliminate the tongue trusting habit and redefine perioral muscular function, close the open bite by correcting the inclinations of the maxillary and mandibular occlusal planes, correct the axial inclinations of the anterior teeth and improve facial appearance and labial balance.

Non-extraction treatment plan was decided for the patient. Patient was advised to perform tongue exercise to correct tongue thrusting habit. An innovative technique was decided upon which was a modification of Enacar method of open bite correction.(Figure 2)

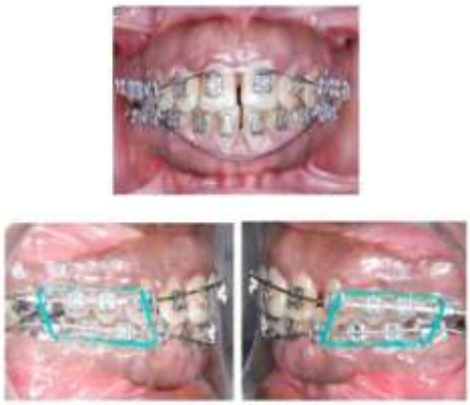

FIGURE 2- MECHANICS PHOTOGRAPH

Preadjusted 0.022 slot mechanotherapy was used and initial wires were used for alignment. After alignment, 17x25 reverse niti was placed in upper and lower jaw. Heavy class II elastic used in Enacar modification which was replaced in our case by box elastic placed in class II manner. 3/16 inch box elastics were used which provided 4 oz force which was replicated from Kim's method. Figure 3 depicts the occlusion status after the appliance removal.

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FIGURE 3- AFTER APPLIANCE REMOVAL PHOTOGRAPH

Total treatment time was 18 months. Post treatment photographs have been shown in figure 4.

FIGURE 4- POST TREATMENT PHOTOGRAPH

For retention removable Hawley's appliance was place in upper arch and fixed lingual retainers were given in lower arch as shown in figure 5.

FIGURE 5 – RETENTION PHOTOGRAPH

As the patient responded well to the tongue exercise and once the bite was closed the tongue thrusting habit stopped which meant that patient had a secondary type of tongue thrusting. Thus, tongue crib was not included during the treatment and retention.

Open bite bionator was given to the patient for night wear.

II. DISCUSSION

Cangialosi21 suggested that most patients with anterior open bite have skeletal and dentoalveolar features contributing to the malocclusion. The distinction between a skeletal and a dental open-bite malocclusion is a practical matter because there should be different approaches for each condition to obtain an effective and stable treatment result.22 Various therapeutic modalities have been proposed for the treatment of anterior open-bite malocclusion in both growing and non growing patients, depending on the treatment objectives. Conventional orthodontic orthopedic treatment has been directed at inhibiting vertical maxillary growth with headgear, retarding mandibular growth with chincups, and extruding anterior teeth with vertical elastics.23,24 Some other methods that have been used include tongue-crib therapy for habit control, posterior bite-blocks, posterior magnets, magnetic active vertical corrector, and functional appliances.24

MEAW therapy for anterior open bite malocclusion has been demonstrated to be effective for the treatment of this malocclusion. Kim et al25 evaluating its long term stability, found no significant relapse in a 2-year follow-up. This mechanism was able to retract and extrude the anterior teeth and to upright the posterior teeth.22,25 It is a good option for orthodontic treatment of skeletal open bite, although the technique has little or no effect on the skeletal pattern.22

In Kim's method26 a precisely formed multiloop edgewise archwire (MEAW) is used to obtain all objectives of open bite correction. Originally 0.016 x 0.025" SS wire was used on double edgewise bracket with 0.018 slot. In the current case report we have used 0.017 x 0.015" reverse niti wire on 0.022 MBT prescription as it is widely used. In Kim's method 3/16 inch heavy elastics were placed in opposing posterior teeth with the force of 50g when the jaw is closed. This was replicated in our study by using box elastics with the class II vector of force applying a force of 50g.

The Multiloop Edgewise Archwire system advocated by Kim26 extrudes the anterior teeth while uprighting the posterior teeth. This leads to individual uprighting of the posterior segment. Its loops of stainless steel wire, placed in every interdental area, have the same effect as the more

resilient nickel titanium archwire used in our technique. Upper accentuated-curve and lower reverse-curve wires are used because they are simpler, less time-consuming to place, and more hygienic, and they do not irritate the soft tissue. The bite closing mechanism and the treatment results in our case were similar to those of Kim.26,27

Stability is the most important criterion for selecting a method of treatment and retention of open-bite malocclusions. The articles presenting the Multiloop Edgewise Archwire system showed only one case that was stable for at least two years after treatment. This would traditionally have been treated surgically because of the severity of their skeletal problems. 25Our method of orthodontic treatment was successful in correcting the open bites without greatly affecting the patient's facial proportions. This is one such appliance which could act as an aid to orthodontist in treatment of open bite.

CONCLUSION:

Open bite correction be it skeletal or dental in origin is difficult to treat and can be challenging for any orthodontist. Hence, this is one such mechanics which could act as an aid to orthodontist in treatment of open bite malocclusion.

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