

<https://doi.org/10.33472/AFJBS.6.4.2024.947-956>



## African Journal of Biological Sciences



# A Modified Kim's Approach Of Correcting Openbite In Different Skeletal Bases –A Case Series

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### Article History

Volume 6, Issue 4, 2024

Received: 09 March 2024

Accepted: 10 April 2024

doi:10.33472/AFJBS.6.4.2024.947-956

### ABSTRACT:

Anterior open bite is as a condition , characterized by lack of overlap of the maxillary incisor on the incisal third of the lower incisor crown when the posterior teeth are brought into complete occlusion. The diagnosis , treatment planning and retention protocols are complex owing to the etiology of the malocclusion. Based on the age of development , treatment of anterior open bite can either be interceptive or corrective. In patients whose growth has ceased the correction entails either anterior extrusion or posterior intrusion, or a combination of both. Kim had described a method of using multiloop edgewise archwire for posterior intrusion. This article presents two case reports involving two different skeletal bases , that were successfully treated with an innovative methods of open bite correction - The Kim's mechanics , modified with anterior triangular elastics.

**Keywords:** Anterior open bite, reverse curve NiTi, triangular elastics, skeletal jaw bases.

### INTRODUCTION:

Anterior open bite is as a condition , characterized by lack of overlap of the maxillary incisor on the incisal third of the lower incisor crown when the posterior teeth are brought into complete occlusion. The degree of severity of malocclusion is variable with each case and may entail the loss

of tooth contacts and decreased overbite, causing a deterioration of the occlusion, difficulties of mastication and speech, a compromised facial appearance and a reduced bite force. [1] The diagnosis, treatment, and successful retention of open bite is specific to the age of development and etiology of open bite. [1,2-4]. The etiology of open bite in childhood, may be attributed to forces that arise from digit/pacifier sucking habits [2,4-9], heredity, lymphatic tissue [7-10] tongue and orofacial muscle activity [11], orofacial functional matrices [12], airway obstruction [13]. In adult patients, the cause is attributed to degenerative changes of the temporomandibular joint (TMJ) caused by systemic rheumatic diseases or osteoarthritis, resulting in posterior rotation of the mandible mandibular condylar fractures, growth hormone disturbances, tumors in the jaws and relapses after orthodontic treatment may also cause bite opening. Macroglossia can affect the jaws and result in an open bite, but after a surgical reduction of the tongue, the occlusion was found to improve. In adults with neuro muscular dystrophy, anterior bite opening commonly develops. 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 are not conclusive to predict the treatment response and stability of an open-bite malocclusion [15,16]. The overbite depth indicator (ODI) proposed by Kim [17], 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  $74^\circ \pm 6.07^\circ$ ; a value of  $68^\circ$  or less indicates a skeletal open-bite tendency [17]. The modalities of treatment include intercepting the habit with habit breaking appliances or in patients whose growth has ceased corrective orthodontic therapy using fixed appliances or orthognathic surgery based on the severity of the anterior open bite [18].

This article describes two case reports involving two different skeletal bases, that were successfully treated with an innovative method of open bite correction – The Kim's mechanics, modified with anterior triangular elastics.

#### **APPLIANCE DESIGN :**

The appliance is a modification of the MEAW technique introduced by Charles Tweed [17]. The multiple loops were replaced by the reverse curve of Spee in the lower arch and the exaggerated curve of Spee in the upper arch. Enacar et al. gave a modification by placing a reverse curve in both arches along with very heavy Class II elastics [18]. In our study, we have used a  $17 \times 25$  reverse curve NiTi archwire with anterior triangular elastic.

#### **CASE REPORT –1:**

A 19-year old male patient had reported with a chief complaint of missing tooth in his right upper front tooth region. The patient had no significant medical or dental history.

Clinical examination of the extraoral features of the patient indicated a convex profile, symmetrical face, competent lips, and a flat smile arc.

On intraoral examination the patient had an impacted canine and retained deciduous on the upper right quadrant. Reverse overjet of 3mm was observed. The lower midline had shifted 3mm to the left with reference to the midsagittal plane. The patient had a symmetric openbite extending from his pre-molars. Molar relation was found to be super class I bilaterally.

Functional examination of the patient revealed no abnormality attributing to the openbite.

The cephalometric tracing confirmed that the patient had a Class III skeletal pattern with a retrognathic maxilla, orthognathic mandible and an ANB value of  $-3^\circ$ . The patient had a vertical

growth pattern and proclined maxillary and mandibular incisors. Cephalometric analysis for orthognathic surgery (COGs) dental analysis revealed intrusion of incisors and extrusion of posterior teeth confirming diverging maxillary and mandibular occlusal plane

The objectives of the treatment were to correct the reverse overjet , disimpact the impacted canine and bring it into occlusion, 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.

A non surgical treatment objective to correct the open bite was devised .A modification of encar method of open bite was planned.The patient was strapped up with pre-adjusted MBT 0.022 slot.Once levelling and aligning had been done , the patient was referred to the department of Oral surgery for surgical exposure of the impacted 13.

After the emergence of 13 into occlusion, reverse curve 0.017 \*0.025 NiTi wires were placed and anterior triangular elastics involving the maxillary lateral and canine and mandibular canines were given bilaterally.

Simultaneous correction of the Class III tendency was achieved by prescribing Class III elastics along with the anterior triangular elastics

The occlusal status of the patient had been corrected within a span of 3 months.The patient is currently in the settling phase of treatment.

Post treatment ceph values of the patient indicate a reduction in the SNB , lower incisor to B point of the patient while the maxillary incisor inclination and mandibular incisor inclination increased with a rotation of the maxillary plane.





Fig 1 : Pre-treatment extraoral and intraoral photographs

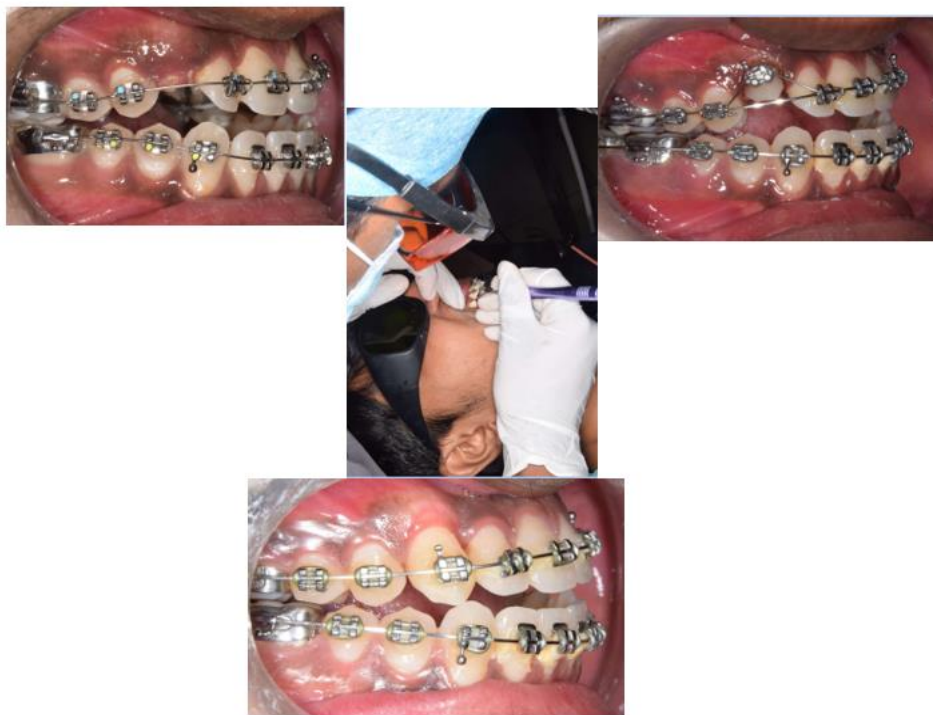


Fig 2 : Surgical exposure of impacted 13, disimpaction of canine into occlusion



Fig 3 : Reverse cure 0.017\*0.025 NiTi wires + Anterior triangular elastics



Fig 4 : Current stage settling -Extraoral and Intraoral

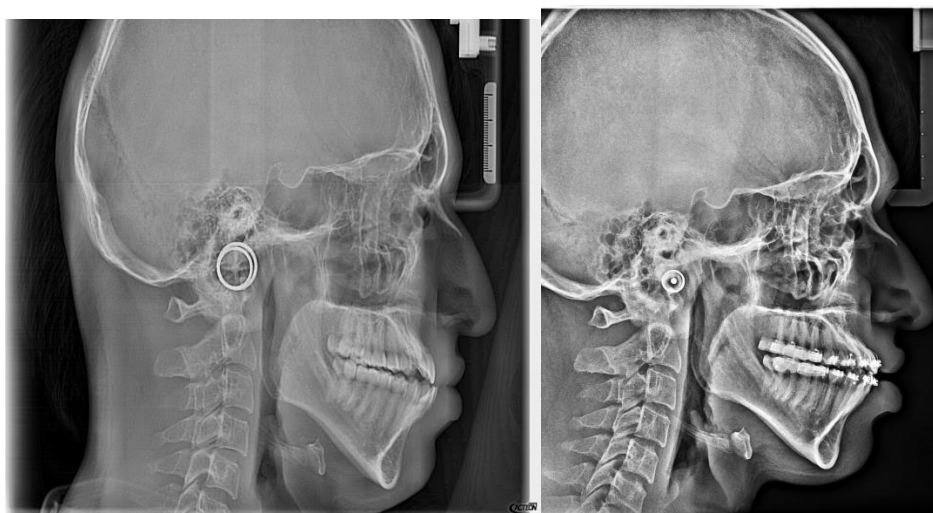


Fig 5 : Pre-treatment and current stage radiographs

**CEPHALOMETRIC VALUES : Table 1 : Case -1 Cephalometric values**

PARAMETERS	PRE TREATMENT	POST TREATMENT	MEAN/SD
SNA	78	78	82+/- 2
SNB	81	80	80+/- 2
ANB	-3	-2	2+/- 2
Upper incisor to NA(mm/degree)	7mm/31	9mm/37	4mm/22
Upper incisor to NB(mm/degree)	10mm/39	8mm/27	4mm/25
Lower incisor to mandibular plane angle(IMPA)	100	90	90
Overjet	-3mm	1 mm	
Overbite	openbite	1 mm	
Interincisal angle	112	117	131
Jarabak ratio	65%	68%	62-65%

**CASE REPORT -2 :**

A 25-year old female patient had reported with a chief complaint of spacing between her upper and lower front tooth region. The patient’s main concern was the esthetic appearance of her teeth affecting her smile.

The patient had a history of bell’s palsy affecting the right side of her face .

Clinical examination of the extraoral features of the patient indicated a convex profile, asymmetrical face, potentially competent lips, and a flat smile arc.

Intraoral examination of the patient revealed a generalized spacing in the maxillary anteriors. The patient had a symmetric openbite extending from her canines. Molar relation was found to be class I on the left while her lower right molar had beenh extracted as a result of carious lesion prior to seeking orthodontic therapy .

Functional examination of the patient revealed that the patient had a tongue thrusting habit.

The cephalometric tracing confirmed that the patient had a Class I skeletal pattern with a orthognathic maxilla and orthognathic mandible . The patient had a vertical growth pattern and proclined maxillary and mandibular incisors. Cephalometric analysis for orthognathic surgery (COGs) dental analysis revealed intrusion of incisors and extrusion of posterior teeth confirming diverging maxillary and mandibular occlusal plane.

The patient was strapped up with MBT 0.022 slot appliance. Tongue tamers were bonded on the palatal surface of the maxillary anterior teeth. After initial levelling and aligning , the patient was put



Fig 6 : Pre-treatment extraoral and intraoral photographs

on reverse curve NiTi wires of size 0.017\*0.025 with Anterior triangular elastics.

The occlusal status of the patient had been corrected within a span of 3 months. The patient is currently in the settling phase of treatment.

Post treatment ceph values of the patient indicate that maxillary incisor inclination and mandibular incisor inclination decreased with a rotation of the maxillary plane



Fig 7 : KIMS mechanics – reverse curve 0.017 \*0.025 NiTi + Anterior elastics



Fig 8 : Current stage Intraoral and Extraoral photographs depicting closure of openbite

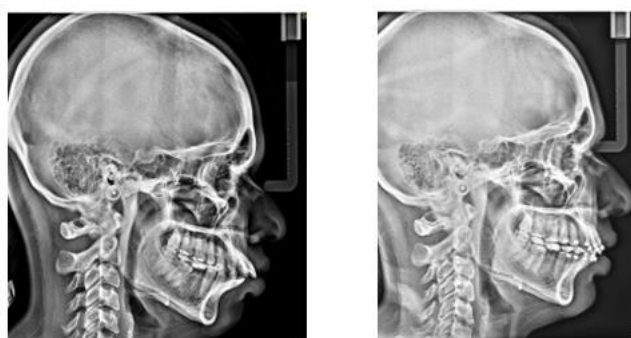


Fig 9 : Pre-treatment and current stage radiographs

**CEPHALOMETRIC VALUES :**

**Table 2 : Case -2 Cephalometric values**

PARAMETERS	PRE TREATMENT	POST TREATMENT	MEAN/SD
SNA	84	84	82+/- 2
SNB	82	82	80+/- 2
ANB	2	2	2+/- 2
Upper incisor to NA(mm/degree)	12mm/40	5mm/23	4mm/22
Upper incisor to NB(mm/degree)	14mm/47	5mm/26	4mm/25
Lower incisor to mandibular plane angle(IMPA)	113	92	90
Overjet	5mm	2mm	
Overbite	openbite		
Interincisal angle	96	130	131
Jarabak ratio	67%	65%	62-65%

**DISCUSSION:**

The treatment for open bite problems ranges from observation of simple habit control procedures to complex surgical procedures. This is complicated by the fact that vertical growth is the last dimension to be completed. Cangialosi et al [19] proposed both skeletal and dentoalveolar features



attributing to anterior open bite . Various therapeutic modalities have been proposed for the treatment of anterior open-bite malocclusion in both growing and nongrowing patients, depending on the treatment objectives [20]. The vertical maxillary growth is inhibited with headgear, retarding mandibular growth with chin cups, and extruding anterior teeth with vertical elastics in most of the orthodontic-orthognathic therapy [21,22]. Other interceptive methods include tongue-crib therapy for habit control, posterior bite-blocks, posterior magnets, magnetic active vertical correctors, and functional appliances. Any of the mixed dentition approaches must take several factors into account including facial growth .Fixed appliance therapy with its extrusive biomechanics, must not reverse gains previously made. Combinations of techniques may be essential even during the finishing and retentive phases. For that reason, it may be best to tackle only mild or moderate problems or those in patients who are near the end of growth, and not severe open bite problems. Second, any treatment aimed at controlling eruption in one arch must guard against compensatory eruption in the opposing arch .MEAW therapy for anterior open-bite malocclusion has been demonstrated to be effective in the treatment of anterior openbite . Kim et al. evaluating its long-term stability found no significant relapses in a 2-year follow-up. This mechanism was able to retract and extrude the anterior teeth and to upright the posterior teeth. It is a good option for orthodontic treatment of skeletal open bite, although the technique has little or no effect on the skeletal pattern. In Kim's method [23], a precisely formed MEAW is used to obtain all objectives of open-bite correction. Originally 0.016 × 0.025" stainless steel (SS) wire was used on a double edgewise bracket with a 0.018 slot. In the current case report, we have used 0.017 × 0.015" reverse NiTi wire on 0.022 MBT prescription . In Kim's method, 3/16 inch heavy elastics were placed in opposing posterior teeth with the force of 50 g when the jaw is closed. This was replicated in our study using anterior triangular elastics with the Class III vector of the force applying a force of 50 g in the first case and Class I vector of force in the second. The MEAW system advocated by Kim extrudes the anterior teeth while uprighting the posterior teeth. This leads to individual uprighting of the posterior segment. 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. This is one such appliance which could act as an aid to an orthodontist in the treatment of openbite.

#### CONCLUSION:

Open-bite correction be it skeletal or dental in origin is difficult to treat and can be challenging for any orthodontist. In our case open bite correction in a Class III jaw base and a Class I jaw base was achieved using a modified Kim's mechanics..Depending on the severity and factors affecting the prognosis of the case, effectively incorporating proper biomechanics could give more stable results over a shorter time duration.

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