A New Method for Correction of Anterior Open Bite

Husam Abdullatif, DDS[1]/Ahmet Keles, DDS, DMSc[2]

Aim: *The aim in this study was to treat anterior open bite by intruding the maxillary molars while not adversely affecting the smile with extrusion of the anterior teeth.* **Method:** *The authors selected eight treatment patients (average age 13 years 1 month) and seven control patients (average age 11 years 9 months) to test their new method for anterior open bite correction. A modified full-coverage acrylic cap splint expander, with tubes at the premolar region, was cemented, and the screw was activated twice a day for 7 days. After expansion was achieved, occipital headgear was used with a newly designed facebow. The inner bows of the facebow were inserted in the buccal tubes on the cap splint and the outer bows were bent downward. The tips of the outer bows ended sagittally at the same level, between the root tips of maxillary first and second premolars. The force was directed upward and backward by the occipital headgear. This force design ensured an intrusive force on the maxilla and a clockwise moment, which contributed to the intrusion of the maxillary posterior teeth. The appliance was used for 6 months ± 2 weeks, followed by second-stage orthodontic treatment.* **Results:** *The cephalometric results showed that the SN/MP angle decreased an average of 1.44 degrees ($P < .05$). The angle between the upper occlusal plane and SN (UOP/SN) increased an average of 6.88 degrees ($P < .01$) due to the clockwise rotation of the maxillary dentition. The SNB angle increased an average of 0.69 degrees ($P < .05$). The maxillary incisors were retroclined an average of 6.38 degrees ($P < .01$) with respect to the SN plane; they did not extrude significantly posttreatment. The maxillary first molars were intruded an average of 2.81 mm ($P < .01$) and the second molars were intruded an average of 2.13 mm ($P < .05$). Finally, the overbite was increased an average of 3.75 mm ($P < .01$) and the overjet was decreased an average of 3.94 mm ($P < .01$).* **Conclusion:** *This appliance can be effective on patients with anterior open bite and excessive posterior maxillary growth.* World J Orthod 2001;2:232–243.

The etiology of anterior open bite is multifactoral. Skeletal, soft tissue, dental, habitual, and growth-related factors play roles in its development. Consequently, many treatment options and techniques have been developed to resolve this problem. However, most of these have difficulty achieving and maintaining satisfactory treatment results.

Most anterior open bite cases are characterized by Class II skeletal pattern and increased mandibular plane angle, decreased palatal plane angle, and increased lower anterior facial height with hyperdivergent skeletal pattern.[1,2] Protrusion of the incisors and overeruption of the molars are the most common causes of anterior open bite.[3–6] Since molars hinge the occlusion, their overeruption rotates the mandible downward and backward, which accentuates the open bite and Class II skeletal pattern.

Patients with severe skeletal anterior open bites are more difficult to treat and, ultimately, retain. Several appliances and methods have been developed to treat this malocclusion. Functional appliances are used to correct anterior open bite,[7,8] magnets are used to intrude the molars,[9–12] and fixed intraoral mechanics are used to extrude the anterior teeth or

[1]Orthodontic Resident, Department of Orthodontics, Marmara University, Faculty of Dentistry, Istanbul, Turkey.
[2]Assistant Professor, Department of Orthodontics, Marmara University, Faculty of Dentistry, Istanbul, Turkey.

REPRINT REQUESTS/CORRESPONDENCE
Dr Ahmet Keles, Halaskargazi Cad. Halas apt. 275/4, Osmanbey, 80220 Istanbul, Turkey. E-mail: keles@ortodonti.com

Fig 1 **(a)** Occlusal view of acrylic cap splint expander. **(b)** Side view of acrylic cap splint expander. **(c)** Application of specially designed facebow.

intrude the posterior teeth with reverse and accentuated curved arches and anterior elastics.[13–15] However, these approaches often do not effectively intrude the maxillary molars. The deterioration of esthetics, due to overextrusion of the incisors, excessive visible gingival tissue, and poor stability of overerupted anterior teeth, results in unsatisfactory treatment results for anterior skeletal open bite. Currently, surgical impaction of the maxillary posterior segment is considered the most efficient treatment option in nongrowing patients.

To minimize the adverse effects of the previously described methods and appliances, the authors developed a new method for correction of anterior open bite that intrudes the maxillary posterior teeth with a minimal amount of anterior extrusion.

MATERIAL AND METHODS

Case selection

The authors selected eight patients for treatment in the Department of Orthodontics at Marmara University, Faculty of Dentistry. The patients consisted of four males, with an average age of 13 years 11 months, and four females, with an average age of 12 years 4 months. All patients had significant anterior open bite without anterior tooth contact. Every patient had excessive vertical growth pattern (SN-MP > 40 degrees), Class II malocclusion (ANB > 4 degrees), increased anterior facial height, and narrow maxilla with overerupted molars. All patients had two distinct and divergent occlusal planes. The upper and lower occlusal planes intersected in the molar region. This disharmony led to the occurrence of anterior open bite. The average treatment duration was 6 months ±2 weeks, followed by fixed orthodontic treatment. Cephalometric radiographs were taken before treatment and immediately after removal of the cap splint expander.

The control group consisted of seven patients with an average age of 11 years 9 months. Four of these patients were females with an average age of 11 years 6 months, and the other three were males with an average age of 12 years 1 month. Every patient in the control group had a high-angle growth pattern (SN-MP > 38 degrees) with Class II (ANB > 4 degrees) skeletal pattern. The control group was followed for a period of 6 months and cephalometric records were taken.

Appliance design

The intraoral appliance was a full-coverage acrylic cap splint expander with two additional tubes positioned between the first and second premolar regions on the buccal side of the acrylic, as previously described[16] (Figs 1a and 1b). The tubes were used for insertion of the inner bows of the facebow.

According to Teuscher,[17] the center of resistance of the maxillary dentoalveolar complex is located between the root tips of the first and second premolars. The outer bows of the facebow were bent downward at an angle of 45 degrees and ended at the center of resistance of the maxillary dentoalveolar complex sagittally and, vertically, 50 to 60 mm below this center of resistance (Fig 1c). The occipital headgear generated a backward and upward force,

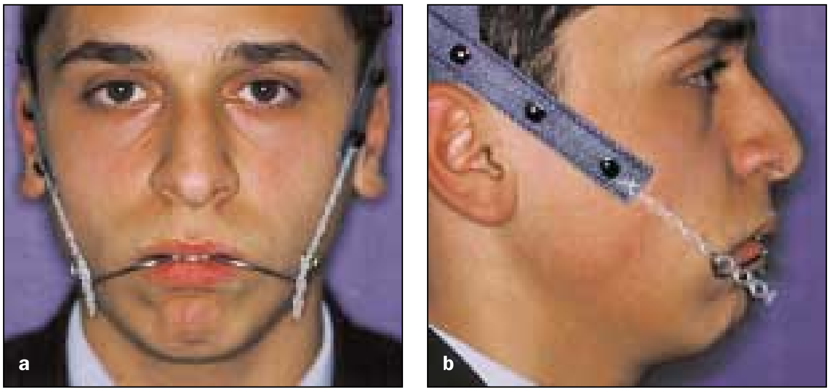


Fig 2 **(a)** Frontal view of the extraoral appliance. **(b)** Side view of the extraoral appliance.

Fig 3 Biomechanics of force system. F, occipital headgear force; F_x, Horizontal component of F (distal force); F_y, Vertical component of F (intrusive force); D, Perpendicular distance between the center of resistance of maxillary dentoalveolar complex and the point of force application; M_x, Clockwise moment generated by F_x.

which was applied with the help of the newly designed facebow (Figs 2a and 2b). The backward and upward force had a vertical intrusive vector that passed through the center of resistance of the maxillary dentoalveolar complex and a horizontal distal vector that produced a clockwise moment. These tended to distalize the maxillary unit, as well as intrude the posterior teeth and extrude the anterior teeth by clockwise rotation. The extrusion of the anterior teeth due to the rotation would be reduced by the vertical intrusive component of the headgear force. The biomechanics of the force system is presented in Fig 3. Mechanically, the intrusive effect on the molars would be greater than the extrusive effect on incisors.

Treatment protocol

The treatment was initiated by cementing the maxillary cap splint expander. The screw was activated twice a day for 7 days. After the first week of expansion, high-pull headgear was applied. The patients were advised to wear their headgear 14 to 16 hours a day. The magnitude of the force was adjusted 500 g/side, and the patients were recalled on a monthly basis to assess the effect of this newly introduced force system. The cap splint was removed after 6 months and cephalometric radiographs were taken. After the removal of the cap splint, a hyrax expansion appliance was cemented, and fixed orthodontic treatment was initiated. For retention of the anterior bite closure, a new facebow of the same design was constructed and inserted into the molar tubes of the hyrax expander. The patients were instructed to wear the headgear 8 to 10 hours a day for 6 months. The screw was activated if there was any premature contact or constriction in the posterior region.

Statistical method

The authors used 25 cephalometric parameters in this study (Fig 4). The angular and linear changes related to the maxilla and mandible were assessed with Wilcoxon signed rank test. Comparison of the changes between the control group and the treatment group were assessed with the Mann-Whitney *U* test. The NCSS statistical package (Number Cruncher Statistical System) was used for statistical evaluation of the data. The mean, median, and standard deviations were calculated for each measurement (Tables 1 to 3).

Dahlberg's method was used to calculate the operator's method error. Fifteen cephalograms were randomly selected from a total of 30 radiographs. They were measured twice, at different intervals, by the same investigator. The error for linear measurements was 0.13 to 0.53 mm, and for angular measurements the error was 0.22 to 0.65 degrees.

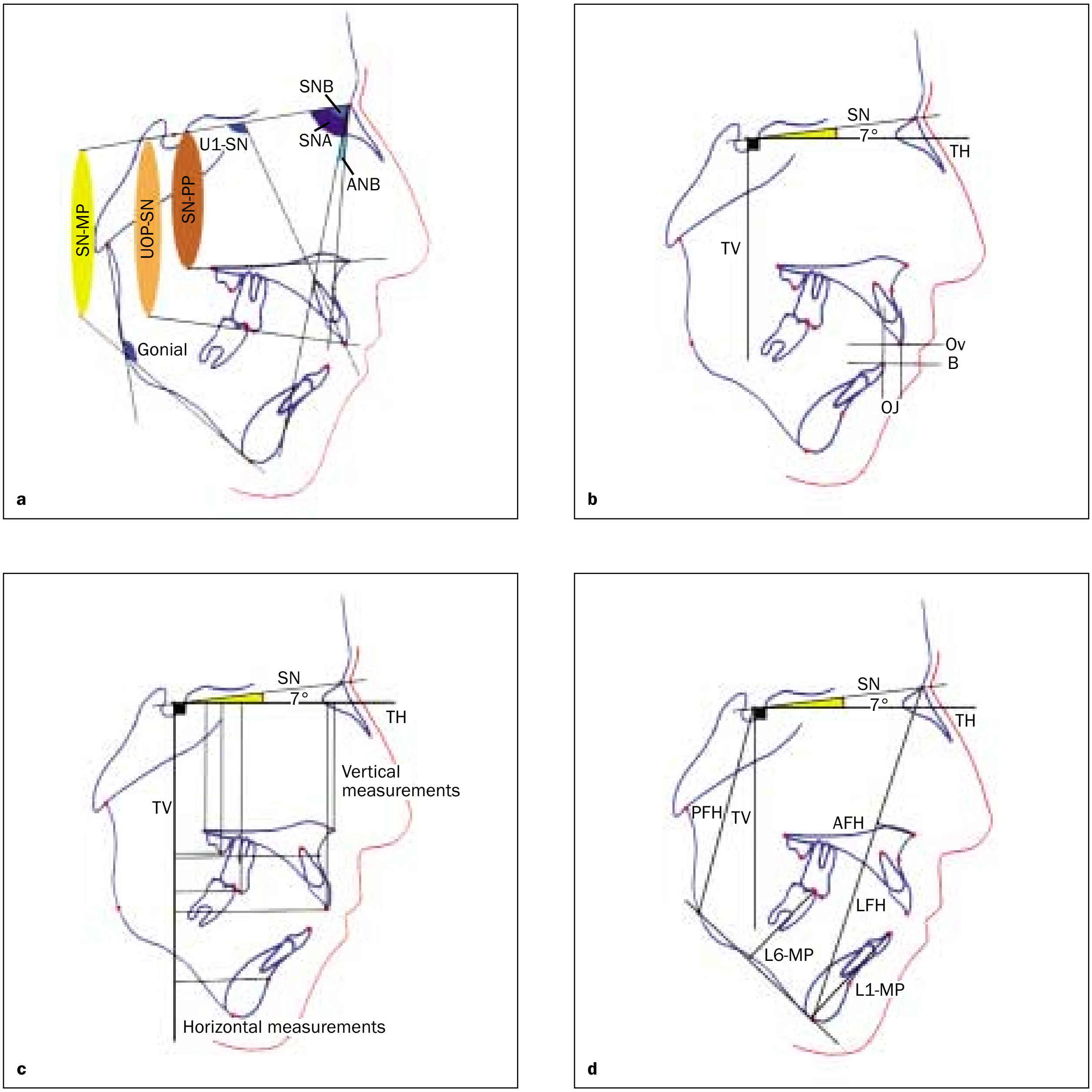


Fig 4 **(a)** Cephalometric angular measurements. **(b to d**) Cephalometric linear measurements.

Table 1 Cephalometric evaluation of the treatment group

Measurements	Mean	SD	Minimum	Maximum	*P* value	Probability
Overbite (mm)	3.75	2.17	2.0	8.5	.01	**
Overjet (mm)	–3.94	1.88	–7.0	–1.0	.01	**
SN/MP (deg)	–1.44	1.64	–4.5	1.0	.04	*
Palatal plane/SN (deg)	0.44	1.27	–1.0	2.5	.31	NS
Upper occlusal plane/SN (deg)	6.88	3.49	3.0	13.0	.01	**
Gonial angle (deg)	0.875	2.30	–2.0	5.0	.28	NS
SNA (deg)	–0.19	0.75	–1.0	1.0	.42	NS
SNB (deg)	0.69	0.46	0	1.0	.03	*
ANB (deg)	–1.00	0.96	–3.0	0.5	.02	*
U1/SN (deg)	–6.38	3.81	–14.0	–2.0	.01	**
Anterior facial height (mm)	–0.25	2.38	–5.0	2.0	1.00	NS
Posterior facial height (mm)	1.75	1.75	0	4.0	.08	NS
Lower facial height (mm)	–0.75	2.25	–4.0	2.0	.35	NS
L6-mandibular plane (mm)	0.50	1.20	–1.0	2.0	.25	NS
L1-mandibular plane (mm)	0.13	0.64	–1.0	1.0	.59	NS
ANS-true horizontal (mm)	0.56	0.62	0	1.5	.07	NS
PNS-true horizontal (mm)	–0.25	1.04	–2.0	1.0	.50	NS
U1-true horizontal (mm)	1.00	1.20	0	3.0	.07	NS
U6-true horizontal (mm)	–2.81	1.19	–4.0	–1.0	.01	**
U7-true horizonal (mm)	–2.13	1.96	–4.0	1.0	.04	*
A-true vertical (mm)	–0.25	0.89	–2.0	1.0	.42	NS
B-true vertical (mm)	1.00	1.51	–1.0	3.0	.09	NS
U1-true vertical (mm)	–2.63	1.06	–4.0	–1.0	.01	**
U6-true vertical (mm)	–1.75	1.36	–3.5	0	.02	*
U7-true vertical (mm)	–1.56	1.50	–3.5	1.0	.02	*

*$P < .05$; **$P < .01$; NS, not significant.

RESULTS

The results showed that the overbite increased an average of 3.75 mm ($P < .01$), while the overjet decreased an average of 3.94 mm ($P < 0.01$) in the treatment group. A decrease of 1.44 degrees ($P < .05$) in the SN/MP angle was seen. This angle continued to decrease after the removal of interferences and the cap splint expander, which had resulted in temporary premature contacts between the maxillary and mandibular dentition. The angle between the upper occlusal plane and SN (UOP/SN) increased an average of 6.88 degrees ($P < .01$) due to the clockwise rotation of the maxillary dentition. The increase in UOP/SN contributed to the improvement of the occlusal plane cant and the closure of the anterior open bite. During treatment, anterior facial height decreased an average of 0.25 mm and lower facial height decreased an average of 0.75 mm. However, neither change was statistically significant. Posterior facial height increased an average of 1.75 mm; this was not statistically significant. SNA decreased an average of 0.19 degrees, which was not statistically significant. SNB increased an average of 0.69 degrees ($P < .05$) during the treatment period, which led to a decrease of 1 degree in the ANB angle ($P < .05$).

The maxillary incisors were retroclined with respect to the SN plane by an average of 6.38 degrees ($P < .01$), and were relatively extruded 1 mm. The incisor extrusion was not statistically significant. This relative extrusion could be related to the

Table 2 Cephalometric evaluation of the control group

Measurements	Mean	SD	Minimum	Maximum	*P* value	Probability
Overbite (mm)	0.50	1.04	–1.0	2.0	.20	NS
Overjet (mm)	–0.14	1.21	–2.0	2.0	.36	NS
SN/MP (deg)	0.07	0.49	–0.5	1.0	.65	NS
Palatal plane/SN (deg)	0.50	1.66	–2.0	3.0	.46	NS
Upper occlusal plane/SN (deg)	0.57	1.48	–1.0	2.5	.35	NS
Gonial angle (deg)	0	1.89	–3.0	3.0	1.00	NS
SNA (deg)	–0.71	1.98	–4.0	2.0	.40	NS
SNB (deg)	–0.79	1.78	–4.0	1.0	.29	NS
ANB (deg)	0.07	0.84	–1.0	1.0	.89	NS
U1/SN (deg)	0.79	6.93	–9.0	14.0	.24	NS
Anterior facial height (mm)	1.71	1.25	0	3.0	.04	*
Posterior facial height (mm)	1.77	1.07	0	3.5	.03	*
Lower facial height (mm)	0.93	1.02	0	2.5	.07	NS
L6-mandibular plane (mm)	1.07	1.37	–1.0	3.0	.09	NS
L1-mandibular plane (mm)	0.07	0.19	0	0.5	.98	NS
ANS-true horizontal (mm)	0.93	1.30	–1.0	2.5	.11	NS
PNS-true horizontal (mm)	0.64	0.85	0	2.0	.11	NS
U1-true horizontal (mm)	1.57	0.98	0	3.0	.03	*
U6-true horizontal (mm)	0.93	0.93	0	2.0	.07	NS
U7-true horizonal (mm)	2.00	1.53	0	5.0	.03	*
A-true vertical (mm)	–0.93	1.10	–2.0	0.5	.08	NS
B-true vertical (mm)	–1.07	2.21	–4.0	1.5	.35	NS
U1-true vertical (mm)	–0.86	2.67	–5.0	2.0	.60	NS
U6-true vertical (mm)	–0.29	2.44	–4.0	2.5	.75	NS
U7-true vertical (mm)	–0.43	1.97	–3.0.	2.5	.47	NS

*$P < .05$; **$P < .01$; NS, not significant.

change of the incisor inclination, which was due to the clockwise rotation of the maxillary dentition. The maxillary first molar intruded an average of 2.81 mm ($P < .01$), and the second molars intruded an average of 2.13 mm ($P < .05$). The mandibular molars and the mandibular incisors were extruded 0.5 mm and 0.13 mm, respectively; however, neither change was statistically significant. The maxillary incisors moved distally an average of 2.63 mm ($P < .01$), and the first and second molars moved an average of 1.75 mm ($P < .05$) and 1.56 mm ($P < .05$), respectively. Cephalometric evaluation of the treatment group is presented in Table 1.

In the control group, almost all changes were not statistically significant (Table 2). However, anterior facial height increased an average of 1.71 mm ($P < .05$). Posterior facial height increased an average of 1.77 mm ($P < .05$). U1/TH increased an average of 1.57 mm ($P < .05$) and U7/TH increased an average of 2 mm ($P < .05$). Cephalometric evaluation of the control group is presented in Table 2.

To assess the differences between the treatment group and the control group, the Mann-Whitney U test was used. Differences in overbite were statistically significant ($P < .01$); the increase in overbite in the treatment group (3.75 mm) was greater than the increase in the control group (0.5 mm). Differences in overjet reduction were statistically significant ($P < .01$); overjet decreased in the treatment group an average of 3.94 mm ($P < .01$) and did not change in the control group. The SN/MP angle changes were statistically significant ($P < .05$). The

Table 3 Cephalometric comparison of the treatment and control groups

	Treatment		Control			
Measurements	Mean	SD	Mean	SD	*P* value	Probability
Overbite (mm)	3.75	2.17	0.50	1.04	.002	**
Overjet (mm)	–3.94	1.88	–0.14	1.21	.003	**
SN/MP (deg)	–1.44	1.64	0.07	0.49	.04	*
Palatal plane/SN (deg)	0.44	1.27	0.50	1.66	.91	NS
Upper occlusal plane/SN (deg)	6.88	3.49	0.57	1.48	.001	***
Gonial angle (deg)	0.875	2.30	0	1.89	.49	NS
SNA (deg)	–0.19	0.75	–0.71	1.98	.56	NS
SNB (deg)	0.69	0.46	–0.79	1.78	.03	*
ANB (deg)	–1.00	0.96	0.07	0.84	.06	NS
U1/SN (deg)	–6.38	3.81	0.79	6.93	.02	*
Anterior facial height (mm)	–0.25	2.38	1.71	1.25	.06	NS
Posterior facial height (mm)	1.75	1.75	1.77	1.07	.95	NS
Lower facial height (mm)	–0.75	2.25	0.93	1.02	.18	NS
L6-mandibular plane (mm)	0.50	1.20	1.07	1.37	.42	NS
L1-mandibular plane (mm)	0.13	0.64	0.07	0.19	.91	NS
ANS-true horizontal (mm)	0.56	0.62	0.93	1.30	.52	NS
PNS-true horizontal (mm)	–0.25	1.04	0.64	0.85	.13	NS
U1-true horizontal (mm)	1.00	1.20	1.57	0.98	.33	NS
U6-true horizontal (mm)	–2.81	1.19	0.93	0.93	.001	***
U7-true horizonal (mm)	–2.13	1.96	2.00	1.53	.003	**
A-true vertical (mm)	–0.25	0.89	–0.93	1.10	.30	NS
B-true vertical (mm)	1.00	1.51	–1.07	2.21	.06	NS
U1-true vertical (mm)	–2.63	1.06	–0.86	2.67	.15	NS
U6-true vertical (mm)	–1.75	1.36	–0.29	2.44	.13	NS
U7-true vertical (mm)	–1.56	1.50	–0.43	1.97	.27	NS

*$P < .05$; **$P < .01$; ***$P < .001$; NS, not significant.

SN/MP angle decreased in the treatment group (−1.44 degrees), while it was stable to slightly increased in the control group (0.07 degrees). Another significant change was found in UOP/SN ($P < .001$); this increased an average of 6.88 degrees ($P < .01$) in the treatment group, while increasing an average of only 0.57 degrees in the control group. SNB differences were statistically significant ($P < .05$); this increased in the treatment group (0.69 degrees) and decreased in the control group (−0.79 degrees). The U1/SN angle contrasted significantly ($P < .05$) between the two groups; it decreased an average of 6.38 degrees ($P < 0.01$) in the treatment group and increased an average of 0.79 degrees in the control group. Finally, the U6/TH and U7/TH measurements contrasted between the two groups ($P < .001$) and ($P < .01$), respectively. The maxillary first molars were intruded 2.81 mm ($P < .01$) in the treatment group and extruded 0.93 mm in the control group.

Progress from the start of treatment to the end of second-stage treatment is presented, by monthly intervals, in Fig 5. Intraoral and extraoral views of another severe open bite case, before and at the end of second-stage treatment, are presented in Fig 6.

Skeletal and maxillary dentoalveolar composite superimpositions of the treatment group are presented in Fig 7a. By analyzing the maxillary superimposition, the authors located the center of rotation of the maxillary dentoalveolar complex (Fig 7b). The center of rotation was the intersection of the

Fig 5 Case 1. **(a)** Intraoral frontal view at the beginning of the treatment. **(b)** One month after cementation of the cap splint expander. Vertical measurement of anterior open bite (overbite was –4 mm). **(c)** Four months after the application of headgear. Vertical measurement of the anterior open bite (overbite was –2 mm). **(d)** Six months after the application of headgear. Vertical measurement of the anterior open bite (overbite was 0 mm). **(e)** After the removal of the acrylic cap splint (overbite was 1 mm). **(f)** At the end of second-stage orthodontic treatment (overbite was 2 mm).

perpendicular lines drawn from the midpoints of the pretreatment and posttreatment locations of the incisors and molars. The superimposition showed that the center of rotation of the maxilla was located at the incisor root tip region, which was anterior to the center of resistance of the maxillary dentoalveolar complex. This contributed to the intrusion of the molars, without significant extrusion of the incisors during rotation.

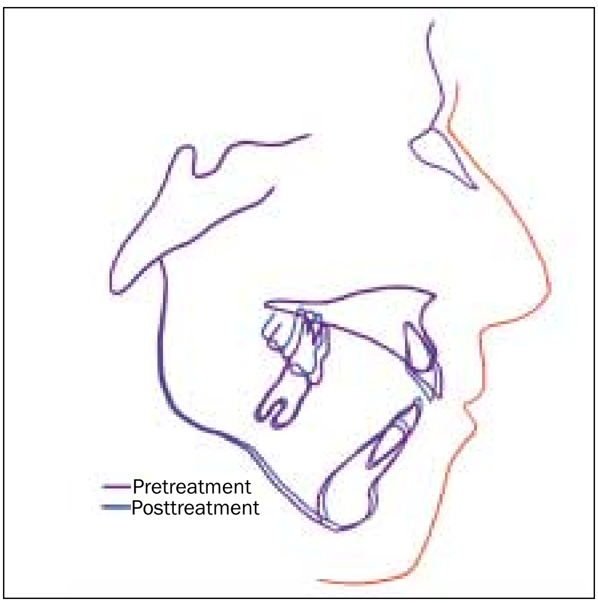
DISCUSSION

By intruding the posterior teeth without extruding the incisors, this method results in an effective treatment for anterior open bite.

Molars act as hinges in occlusion. To improve the esthetics and achieve stable treatment results in anterior open bite, high-angle growth pattern patients with excessive posterior maxillary growth, molar intrusion should be the treatment goal. The literature states that overerupted posterior teeth are the major cause of anterior open bite.[5,18,19] Investigators have attempted to slow posterior growth and intrude the maxillary posterior teeth to correct anterior open bite.[19]

In the present treatment protocol, headgear was used and force was applied to the whole maxilla rather than the first molars. This was advocated for two main reasons: *(1)* to intrude the maxillary posterior segments and control the vertical growth and *(2)* to improve the sagittal relationship.

Fig 6 Case 2. **(a)** Profile view at the beginning of treatment. **(b)** Frontal view at the beginning of the treatment. **(c)** Smiling view at the beginning of the treatment (posterior gummy smile was present). **(d)** Intraoral right view at the beginning of treatment. **(e)** Intraoral frontal view at the beginning of treatment. **(f)** Intraoral left view at the beginning of the treatment. **(g)** Intraoral maxillary occlusal view at the beginning of treatment. **(h)** Intraoral mandibular occlusal view at the beginning of treatment. **(i)** Profile view at the end of active orthodontic treatment. **(j)** Frontal view at the end of active orthodontic treatment. **(k)** Smiling view at the end of active orthodontic treatment (posterior gummy smile was eliminated). **(l)** Intraoral right view at the end of active orthodontic treatment. **(m)** Intraoral frontal view at the end of active orthodontic treatment. **(n)** Intraoral left view at the end of active orthodontic treatment. **(o)** Intraoral maxillary occlusal view at the end of active orthodontic treatment. **(p)** Intraoral mandibular occlusal view at the end of active orthodontic treatment.



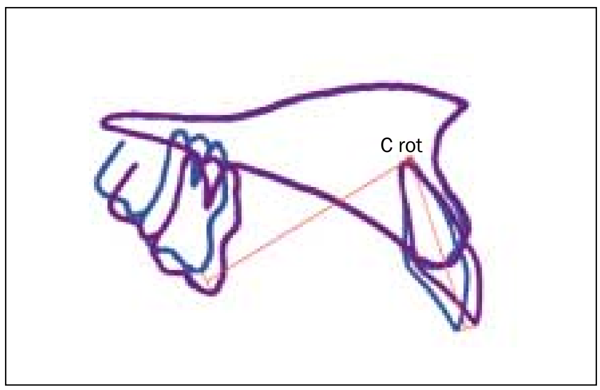


Fig 7 **(a)** *(left)* Composite cephalometric superimposition of the treatment group. **(b)** *(above)* Composite maxillary superimposition of the treatment group and presentation of the center of rotation of the maxillary dentoalveolar complex.

To achieve these goals, the authors used a newly developed facebow design. The inner bows were inserted into the tubes, which were embedded in the acrylic cap splint. The outer bows of the facebow bent downward at an angle of 45 degrees and ended at the point below the center of resistance of the maxillary dentoalveolar complex.

This special force system had vertical and horizontal components. The vertical component delivered an intrusive force on the entire maxillary dentoalveolar complex and passed through the center of resistance of the maxillary dentition. From a mechanical point of view, when a force is applied to an object and the force vector passes through the center of resistance, it produces translation. In the authors' system, the direction of translation was upward. The horizontal component of the force generated distal force and a clockwise moment that effectively corrected the Class II relationship. The clockwise moment generated by the distal force contributed to the intrusion of the posterior teeth. Sagittally, the point of force application was at the same level as the center of resistance of the maxillary dentoalveolar complex. Vertically, however, it was far below the center of resistance. The definition of moment is force multiplied by perpendicular distance from the center of resistance. Since the perpendicular distance between the center of resistance and point of force application was about 50 to 60 mm, the moment generated was significant (see Fig 3).

The molar intrusion allowed the mandible to rotate upward and forward, which improved the vertical and sagittal relationships and, finally, corrected the anterior open bite related to excessive posterior growth. At the end of treatment, the patient shown in Fig 5 had an improved profile, and the amount of visible incisal gingival tissue had not increased.

It was necessary to construct a hyrax expansion appliance after the removal of the cap splint to eliminate posterior crossbite and premature contacts. To maintain the intrusion of the posterior segment, headgear was worn for retention. Clinically, the SN/MP angle continued to decrease as the interferences and premature contacts were gradually removed during second-stage orthodontic treatment.

The results show that the maxillary molars were intruded an average of 2.81 mm ($P < .01$). However, the first molars in the control group were extruded 1.19 mm ($P < .01$). Vertical upward movement of the first molars becomes more significant ($P < .001$) when the treatment group and the control group are compared.

In the literature, headgear has been used on first molars to correct anterior open bite. However, mandibular molars were erupted while intruding the maxillary molars, and no rotation of the mandible was observed.[13] In the authors' appliance design, the acrylic cap splint applied intrusive force on the mandibular molars and prevented their eruption. After the cap splint was removed, the mandible spontaneously autorotated, open bite was decreased, and the profile was improved. According to Schendel et al[20] and Fish et al,[21] molar intrusion would be more stable and esthetic in the treatment of anterior open bite.

Kim[22] criticized the use of headgear for molar intrusion. He advocated the extraction of the second or third molars and application of multilooped arches and anterior elastics to upright mesially inclined molars. In another study, Chang and Moon[23] evaluated the anterior open bite. They claimed that correcting the inclination of the teeth would improve the cant of the maxillary and mandibular occlusal planes and that making them parallel to each other would close the bite. However, their results show that no intrusion, other than the uprighting of the maxillary molars, was observed. Enacar et al[14] modified Kim's technique by using 0.016 × 0.022-inch upper accentuated-curve and lower reverse-curve nickel-titanium archwires instead of multiloop archwires. They applied intermaxillary elastics in the canine regions. They suggested that upper accentuated-curve and lower reverse-curve nickel-titanium archwires were simpler and more hygienic than multiloop archwires and that chair time was reduced. They reported results similar to those obtained by the multiloop edgewise archwire system without molar intrusion.

In a recent study, Küçükkeles et al[15] evaluated the changes in dentofacial structures of open bite patients treated with upper accentuated-curve and lower reverse-curve nickel-titanium archwires and intermaxillary elastics. The results of this study showed that bite closure was achieved primarily by extrusion of the mandibular incisors and uprighting of the maxillary incisors. Although the configuration of the archwires in the molar region aimed to intrude and upright the molars, no molar intrusion took place. Instead, the molars were extruded while being uprighted. This technique closed the anterior open bite mainly by extruding the anterior segment.

CONCLUSION

This newly introduced method can be effective in the treatment of growing patients who have anterior open bite due to excessive posterior dentoalveolar growth. The authors believe that intercepting and treating these patients at an early stage, such as during the prepubertal growth period, can correct and improve function and esthetics while sparing them from inevitable surgery at a later stage.

Bite closure with molar intrusion and without any resultant gummy smile, overjet reduction with retroclination of incisors, correction of the occlusal plane cant, decrease in the mandibular plane angle, and upward and forward autorotation of the mandible were all achieved. However, the stability of the treatment results should be assessed long-term.

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