

Correction of anterior open bite malocclusion with a temporary skeletal anchorage device–supported appliance

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Introduction: To evaluate the dental and skeletal changes using a novel miniscrew-supported bite-closing appliance (MBCA) to correct anterior open bite.

Methods: A novel MBCA that uses nickel-titanium springs connected to miniscrews combined with a bite-plate and a low-hanging transpalatal arch to intrude posterior teeth was used. Using cone-beam computed tomography (CBCT) and cephalograms, skeletal and dental changes were measured and discussed in 25 patients with open bites consecutively treated with this appliance.

Results: The MBCA significantly decreased the open bite (2.9 ± 0.1 mm; $P < 0.0001$). Relative to FH, intrusion was achieved on the maxillary second premolars (-2.0 ± 1.5 mm; $P < 0.0001$), first (-2.3 ± 1.8 mm; $P < 0.0001$), and second molars (-1.9 ± 1.6 mm; $P < 0.0001$). This was supported by the results from the CBCT superimpositions that showed intrusion of the maxillary second premolar (-3.2 ± 1.6 mm) and the maxillary first and the second molars (-2.8 ± 1.5 mm and -2.1 ± 1.6 mm, respectively). This resulted in favorable skeletal changes exhibited by a significant decrease in FMA ($-1.4 \pm 2.2^\circ$; $P < 0.005$), SN-MP ($-1.8 \pm 2.4^\circ$; $P < 0.005$), and an increase in PFH (1.2 ± 1.4 mm; $P < 0.05$) and SN-NPog ($1.4 \pm 2.2^\circ$; $P < 0.05$). These results are consistent with the counterclockwise rotation of the mandible. A mandibular lingual holding arch resulted in better vertical control of the mandibular posterior teeth ($P < 0.05$). Follow-up on patients with available posttreatment CBCTs ($n = 8$) suggests some dental relapse at the second premolar (1.5 ± 3.0 mm) and the first (1.7 ± 2.4 mm) and second molars (1.7 ± 2.4 mm), but the skeletal changes were maintained. Visual assessment of patients with posttreatment photographs ($n = 18$) showed that positive overbite was maintained in all subjects.

Conclusions: MBCA can provide satisfactory correction of the anterior open bite through counterclockwise rotation of the mandible. (Am J Orthod Dentofacial Orthop Clin Companion 2023;XX:XX-XX)

Anterior open bite (AOB) lacks vertical overlap of the maxillary and mandibular anterior teeth.¹ AOB is often associated with increased mandibular anterior facial height, divergent occlusal planes, steep

mandibular plane, and overeruption of the posterior teeth.^{1,2} The prevalence of AOB in the United States is estimated to range from 0.1%-2.7%.³ The etiology of AOB is multifactorial, including skeletal, dental, respiratory conditions, and/or habits.⁴ AOB is challenging to treat with high risk of relapse.^{5,6} Growing children may benefit from early interception to redirect facial growth, but correcting AOB in nongrowing patients is more challenging. Both orthodontic and/or surgical approaches have been used.⁵ Orthodontic treatment modalities involve myofunctional therapy, multiloop edgewise arch-wires, high-pull headgear, chin cups, and bite-blocks.⁷⁻¹² Maxillary impaction and mandibular counterclockwise rotation have been the conventional surgical treatment.¹³⁻¹⁵ A similar counterclockwise rotation has been reported with the use of

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All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest, and none were reported.

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