

Graphical abstract

Abstract: This study presents a novel technique utilizing high frequency vibration to shorten treatment time and preserve alveolar bone in challenging orthodontic cases treated with Invisalign® clear aligners. Four non-growing orthodontic patients (age range 14-47 years old) with Class II skeletal patterns (convex profiles with retrognathic mandibles) who sought correction of their crowded teeth and non-surgical correction of their convex profiles were included in this study. These patients were treated using Invisalign clear aligners together with high frequency vibration (HFV) devices (120 Hz) (VPro5™) that were used by all patients for five minutes per day during active orthodontic treatment. Vertical control and forward rotation of the mandible for each patient was achieved through pre-programming the Invisalign to produce posterior teeth intrusion. Successful forward rotation of the mandibles achieved in all patients led to improvement of their facial convex profiles (ANB improved $2.1 + 0.5$ degrees; FMA improved $1.2 + 1.1$ degrees). Dental decompensation was achieved by lingual tipping of the lower incisors and palatal root torque of upper incisors. The use of HFV together with Invisalign facilitated achieving these results within a 12+6 month period. In addition, more bone labial to the lower incisors after their lingual movement was noted. In conclusion, the use of HFV concurrent with SmartTrack Invisalign aligners allowed complex tooth movement and forward projection without surgery in non-growing patients with skeletal Class II relationships. The clinical impact and implications of this case series is that the use of HFV facilitates complex orthodontic tooth movement including posterior teeth intrusion and incisor decompensation in addition to increased bone formation labial to lower incisors that may minimize future gum recession due to their labial inclination.



Before (left) and after (right) treatment clinical photos showing improvement in patient's open bite, spacing and bimaxillary protrusion.