READER'S FORUM

Aldrees AM

Do customized orthodontic appliances and vibration devices provide more efficient treatment than conventional methods?

- *Korean J Orthod* 2016;46:180-5

Q1. The customized orthodontic appliances and vibration devices have been regarded as the most favorable non-invasive methods to enhance orthodontic tooth movement rate. However, as shown in this report, the clinical studies regrading this issue is just first primary stage. To obtain high quality evidence, a substantial improvement of the experimental design would be necessary. Please suggest critical consideration factors when assessing device-assisted orthodontic tooth movement.

Q2. Would the authors prefer these customized appliances over vibration devices? Do they have a promising future? If the authors have experienced this cutting edge technology, I would like to ask their personal "expert opinion".

Q3. The authors concluded that the use of Suresmile® (OraMetrix, Inc., Richardson, TX, USA) can reduce overall treatment time in simple cases. What types of malocclusion and treatment strategy could belong to the simple cases? Please give additional explanation about treatment difficulty as it could be an influencing factor on the appliance efficacy.

Q4. Would customized orthodontic appliances and vibration devices have differential effect of

tooth movement rate based on the treatment stages (leveling and alignment, space closure, and finishing)? For example, previous reports of vibration devices have shown faster treatment in alignment stage than space closure.

Questioned by

Hyo-Won Ahn

Department of Orthodontics, Graduate School, Kyung Hee University, Seoul, Korea

A1. The best data for treatment outcomes come from randomized clinical trials.¹ The proper study design dictates the random allocation of subjects into a well-defined study group and comparable control group (ideally using sham appliances), with each including subjects based on the appropriately calculated sample size. A calibrated examination of the pre-treatment characteristics like the age, gender, and malocclusion severity is essential to ensure proper distribution of the subjects. These confounding factors should be identified, and then the randomization process ensures equalizing them among the groups. Also, the utilization of appropriate statistical analysis is critical to interpret the differences. The device effect should be measured objectively and properly calibrated. Ideally, the outcome should be the total treatment time, or the rate of tooth movement but with a very specific start and end points.

A2. I try to practice with an 'evidence-based' approach to treatment decisions.² This requires a careful assessment of the available evidence and an unbiased judgment of the quality of the studies. So far, there is no credible justification for the added expenses and efforts to use vibration devices because the acceleration in orthodontic

tooth movement could not be verified or is not clinically significant, and thus I do not encourage my patients to purchase these devices. A possible definition of “quack” was introduced by Dr. Kevin O’Brien to be: “the promoter of a technique or a product who knowingly misrepresents the risks and benefits”,³ and these quackery-based treatment/devices usually have very weak level of evidence. Currently, this applies to the vibration devices even though they are widely promoted. I do not personally have experience with customized archwires, but the concept and the available evidence suggest a reasonable reduction in the duration of treatment with the use of these archwires.

A3. The most reliable study that tested the efficiency of Suresmile[®] was a retrospective assessment of treatment duration by Alford et al.⁴ The authors have shown that the use Suresmile[®] had significantly reduced the treatment time by about seven months, but they stated clearly that the Suresmile[®] group of cases had a significantly lower Discrepancy Index score indicating that they represent less complex malocclusion than the conventionally treated cases. Suresmile[®] simply facilitates the finishing stage with customized archwires, so in cases that require orthopedic correction or involve extractions, the reduction in the overall treatment time with Suresmile[®] will certainly be less than in the simple cases that are considered ready for Suresmile[®] scan and insertion of finishing archwires after 3–5 months of initial levelling and alignment. Examples of these simple cases can be found in Sachdeva et al.⁵

A4. When it comes to the customized orthodontic appliances (Insignia[®] [Ormco Corporation, Orange, CA, USA], Suresmile[®]), each is designed to be used at specific stage of orthodontic treatment. Insignia[®] system offers a complete solution with patient-specific brackets and custom archwires, so, it’s manufactured to be indirectly bonded and the enclosed archwires are inserted sequentially throughout the orthodontic treatment starting with the alignment stage followed by space closure and then the finishing stage. While Suresmile[®] provides finishing customized archwires, and thus the utilization of these robot-bent wires should be limited to the stage after

achieving complete leveling and alignment with no spaces. On the other hand, vibration devices that are designed to accelerate the tooth movement like Aceledent[®] (OrthoAccel Technologies, Inc., Bellaire, TX, USA) have not been tested clinically for the entire duration of orthodontic treatment in any study. This is a limitation in the study design, and since that most of the Aceledent[®] studies (with an exception of the Woodhouse et al.⁶) have major defects in the methodology, a meaningful comparison of the rate of tooth movement among them can not be made. Therefore, the simple answer to the question can be: the apparent differences among the studies in rate of tooth movement at different stages is not reliable enough to reach any conclusion.

Replied by

Abdullah M. Aldrees

Division of Orthodontics, Department of Pediatric Dentistry and Orthodontics, College of Dentistry, King Saud University, Riyadh, Saudi Arabia

References

1. Proffit WR. Evidence and clinical decisions: Asking the right questions to obtain clinically useful answers. *Semin Orthod* 2013;19:130–6.
2. Huang GJ. Making the case for evidence-based orthodontics. *Am J Orthod Dentofacial Orthop* 2004; 125:405–6.
3. O’Brien K. Orthodontic quackery. *Am J Orthod Dento-facial Orthop* 2015;148:202–3.
4. Alford TJ, Roberts WE, Hartsfield JK Jr, Eckert GJ, Snyder RJ. Clinical outcomes for patients finished with the SureSmile[™] method compared with conventional fixed orthodontic therapy. *Angle Orthod* 2011;81:383–8.
5. Sachdeva R, Frugé JF, Frugé AM, Ingraham R, Petty WD, Bielik KL, et al. SureSmile: a report of clinical findings. *J Clin Orthod* 2005;39:297–314.
6. Woodhouse NR, DiBiase AT, Johnson N, Slipper C, Grant J, Alsaleh M, et al. Supplemental vibrational force during orthodontic alignment: a randomized trial. *J Dent Res* 2015;94:682–9.

This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.