

## Supplemental Vibrational Force During Orthodontic Alignment: A Randomized Trial

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### Abstract

This prospective 3-arm parallel-group randomized clinical trial investigated the effect of supplemental vibrational force on rate of orthodontic tooth alignment with fixed appliances. Eighty-one subjects (40 males, 41 females; mean age, 14.1 y) undergoing first premolar extraction-based fixed appliance treatment were randomly allocated to treatment supplemented with daily use (20 min) of a removable intraoral vibrational device (AcceleDent; OrthoAccel Technologies Inc.;  $n = 29$ ), an identical nonfunctional (sham) device ( $n = 25$ ), or fixed appliances only ( $n = 27$ ). Mandibular study casts were taken at baseline (treatment start: placement of 0.014-in. nickel-titanium arch wire), initial alignment (0.018-in. nickel-titanium arch wire), and final alignment (0.019 x 0.025-in. stainless steel arch wire). Overall mean irregularity index in the mandibular arch at baseline was  $8.5 \pm 3.8$  mm (95% CI, 7.6 to 9.3) with no significant difference between groups ( $P = 0.73$ ). For the total sample, mean irregularity index at initial alignment was  $2.7 \pm 2.8$  mm (95% CI, 2.2 to 3.4) with no significant difference between groups ( $P = 0.40$ ). Mean time from baseline to initial alignment was  $59 \pm 25$  d (95% CI, 54.5 to 65.6); from initial to final alignment,  $150 \pm 62.5$  d (95% CI, 136 to 165); and baseline to final alignment,  $209 \pm 65$  d (95% CI, 195 to 224). Kaplan-Meier analysis demonstrated that patterns of alignment were not significantly different among the 3 groups ( $P = 0.66$ ). Multivariate linear regression for initial and overall alignment rates using initial irregularity index as the covariate showed no significant differences among groups. The most important influence on both initial and overall rates of alignment was initial irregularity ( $P = 0.1 \times 10^{-4}$ ). This prospective randomized clinical trial found no evidence that supplemental vibrational force can significantly increase the rate of initial tooth movement or reduce the amount of time required to achieve final alignment when used in conjunction with a preadjusted edgewise fixed appliance (ClinicalTrials.gov NCT02314975).