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Effects of mechanical vibration force on tooth movement: Finite element analysisAylin Pasaoglu Bozkurt¹ and Alev Cinsar²¹Beykent University, Turkey²Ege University, Turkey

Objective: The aim of this finite element study was to assess the effect of mechanical vibration force on tooth movement, stress distribution and velocity.

Methods: A 3D model was created using CBCT image of a patient with class 2 malocclusion. Three different analyses were performed on a single model where upper first premolars were extracted. At canine distalization stage; 150 gf, 150 gf and 30 Hz (0.2 N), 150 gf and 111 Hz (0.06 N) were applied to canine. The first moment effect of force and vibration were evaluated using the Algor Fempro finite element analysis program. Stress and displacement distribution were investigated comparatively.

Results: It was observed that the maximum displacement occurred in the second analysis (150 gf-30 Hz), while lower displacement was seen in the third analysis (150 gf-111 Hz), and the lowest amount of displacement was in the first analysis (150 gf). While only force application caused extrusion of the tooth, linear and vibration forces together caused intrusion. In the first analysis canine rotated in the distovestibule direction, but in the second and third analysis, canine showed distopalatal rotation.

Conclusion: It was concluded that in a certain range, mechanical vibration force may have accelerated tooth movement.

Recent Publications

1. Peptan A I, Lopez A, Kopher R A and Mao J J (2008) Responses of intramembranous bone and sutures upon *in vivo* cyclic tensile and compressive loading. Bone. 42(2):432-8.
2. Mao J J, Wang X, Mooney M P, et al. (2003) Strain induced osteogenesis in the craniofacial suture upon controlled delivery of low-frequency cyclic forces. Front Biosci. 8:a10-7.
3. Pavlin D, Anthony R, Raj V and Gakunga P. (2015) Cyclic loading (vibration) accelerates tooth movement in orthodontic patients: A double-blind, randomized controlled trial. (Semin Orthod. 21:187-94).

Biography

Aylin Pasaoglu Bozkurt is an Associate Professor at Beykent University, Department of Orthodontics, Istanbul. She has obtained her PhD at Ege University, Faculty of Dentistry, Department of Orthodontics. Her research interests are different treatment methods used in orthodontics. She is an author of several articles in international journals.

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