World Academy of Science, Engineering and Technology
International Journal of Biomedical and Biological Engineering
Vol:10, No:04, 2016

Observation of the Orthodontic Tooth's Long-Term Movement Using Stereovision System

Authors : Hao-Yuan Tseng, Chuan-Yang Chang, Ying-Hui Chen, Sheng-Che Chen, Chih-Han Chang

Abstract : Orthodontic tooth treatment has demonstrated a high success rate in clinical studies. It has been agreed upon that orthodontic tooth movement is based on the ability of surrounding bone and periodontal ligament (PDL) to react to a mechanical stimulus with remodeling processes. However, the mechanism of the tooth movement is still unclear. Recent studies focus on the simple principle compression-tension theory while rare studies directly measure tooth movement. Therefore, tracking tooth movement information during orthodontic treatment is very important in clinical practice. The aim of this study is to investigate the mechanism responses of the tooth movement during the orthodontic treatments. A stereovision system applied to track the tooth movement of the patient with the stamp brackets. The system was established by two cameras with their relative position calibrate. And the orthodontic force measured by 3D printing model with the six-axis load cell to determine the initial force application. The result shows that the stereovision system accuracy revealed the measurement presents a maximum error less than 2%. For the study on patient tracking, the incisor moved about 0.9 mm during 60 days tracking, and half of movement occurred in the first few hours. After removing the orthodontic force in 100 hours, the distance between before and after position incisor tooth decrease 0.5 mm consisted with the release of the phenomenon. Using the stereovision system can accurately locate the three-dimensional position of the teeth and superposition of 3D coordinate system for all the data to integrate the complex tooth movement.

Keywords : orthodontic treatment, tooth movement, stereovision system, long-term tracking
Conference Title : ICCB 2016 : International Conference on Computational Biomechanics
Conference Location : Istanbul, Türkiye
Conference Dates : April 19-20, 2016

Open Science Index, Biomedical and Biological Engineering Vol:10, No:04, 2016 publications.waset.org/abstracts/45507.pdf