

International Conference and Expo on **Biomechanics & Implant Design** July 27-29, 2015 Orlando, USA

On the effects of a FGM plate on stress pattern at fractured site

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Orthopedic plates are currently used in bone healing process. However they cause density loss in underlying bone because of the change in natural stress patterns. The aim of this study was to evaluate a newly developed bone plate using functional graded material, FGM in term of stress pattern. In the present study, 3D finite element models of tibial bone plate with variable stiffness of a graded material and traditional bone plates made of stainless steel and Ti alloy have been developed by using the ABAQUS software. Effects on the predicted stresses at the fracture site in the presence of a distance between the plate and fractured bone were also studied. For this purpose, a 3D model of tibia was created with the exact geometry of the real bone geometry by using CT scan images of a human left leg. Results showed that the bone plate with graded material offers less stress shielding to the bone, providing a higher compressive stress at bone to induce accelerated healing in comparison with Ti alloy and stainless-steel bone plate. Results also showed that the use of non-contact plates provide a favorable mechanical environment for the following fracture healing.

Biography

Behrooz Sepehri completed his PhD at the age of 32 years in Medical Engineering- Biomechanics in Science and Research Center Branch, Islamic Azad University, Tehran, Iran. He is working as Lecturer for courses related to areas of Biomechanics, such as Introduction to Biomechanics, Biomechanics of Bone Diseases, and Artificial Organs and Limbs. He has also published some 15 papers in related areas.

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