

Comparison of the Effects of Rod Types of Rigid Fixation Devices on the Loads in the Lumbar Spine: A Finite Element Analysis

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Abstract : We developed new design of rod of pedicle screw system that is beneficial in maintaining the spacing between the vertebrae and assessed the performance of the posterior fixation screw systems by numerical analysis according to the range of motion (flexion, extension, lateral bending, and axial rotation) of the vertebral column after inserting the pedicle screws. The simulation results showed that the conventional rod was the most low equivalent stress value among implant units in the case of flexion, extension and lateral bending of the vertebrae. In all cases except the torsional rotation, the results showed that the stress level of the single and double rounded rod exceeded about 30% to 70% compare to the conventional rod. Therefore, this product is not suitable for actual application in the field yet and it seems that product design optimization is necessary. Acknowledgement: This research was supported by the Ministry of Trade, Industry & Energy (MOTIE), Korea Institute for Advancement of Technology (KIAT) through the Encouragement Program for The Industries of Economic Cooperation Region.

Keywords : lumber spine, internal fixation device, finite element method, biomechanics

Conference Title : ICBDB 2017 : International Conference on Biomedical Devices and Biomechanics

Conference Location : Barcelona, Spain

Conference Dates : February 26-27, 2017