

Abstract Submitted
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Study on the Knee Pressure Causing Fatigue in the Tibial Bone

SOO YEON KIM, DOO HYUN NAM, RICHARD KYUNG, Choice Research — Computational stress analysis is widely used in cases when figuring out the clinical conditions of patients is difficult. The purpose of the present research is to evaluate stresses and fracture conditions in the tibial bone caused by various sports activities or accidents, using biomechanical and numerical analysis. The research procedures will include three steps : Examination of biomechanical properties of bones, development of biomechanical and mathematical modeling of the bone, and finding the solutions -stress and fracture conditions in the tibia. By using the above procedure together with the bone remodeling technique, the physiological solutions (maximum stress) of the bones and impact conditions causing the fracture in the bone can be found. The result can be compared to the empirical results found by other scientists and the data could help improve knee arthroplasty, which is a surgical treatment. For the computational and numerical analysis, the bone model can be meshed using a two dimensional element and the nodes on the bottom of the proximal tibial model will be constrained in all directions. To obtain stress distribution in the bone, pressure force will be applied on the top of the bone : For example, total load of 500 N ; 150 N on lateral and 350 N on medial compartment. In this paper, different loads on the lateral and medial compartment are applied to observe the variations in the stress distribution of the tibial component.

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