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Stress and strain analysis in the pelvic bone

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ABSTRACT

In the musculoskeletal system, the pelvis is one of the most important components. The entire body rests on this construction. The role of the pelvis is to transfer gravitational and external load across the sacro-illiac joints and the hip joints.

The purpose of this study is to observe the stress and strain distribution in the pelvic bone in different phases of gait. Due to its complex geometry and structure, the biomechanics of pelvis is complicated. The Finite Element Method (FEM) may be used to analyze this type of very complex geometries. To get the realistic results, the finite element analysis have to be accomplished with a three-dimensional model similar to the shape and architecture of the pelvic bone. Computer tomography scan data is used to create such a model.

The static downward load of 800*N* corresponding to the average weight of the human body as well as the appropriate forces exerted by the muscles under normal walking condition are applied to the model.

Numerical computation results are presented in form of the stress and strain maps. For validation purposes, these quantities are compared with the results obtained by other authors during similar investigations. Good agreement is found for both stresses and strains.

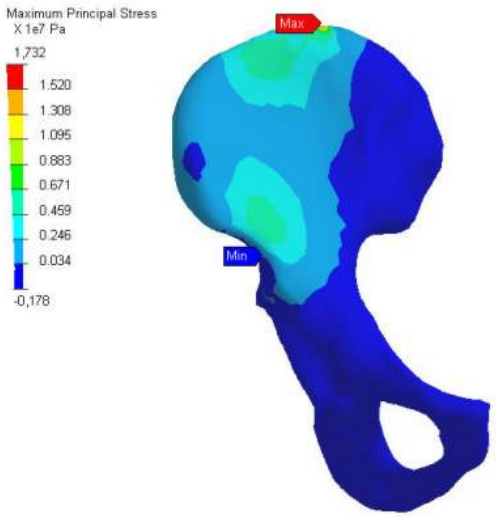

Fig. 1. Maximum principal stresses in pelvic bone during abduction.