

A three dimensional finite element of Anterior Cruciate Ligament model

Abstract

Anterior Cruciate Ligament (ACL) is of the major knee ligament. A three dimensional model that reflects the geometric characteristics of the human ACL developed to explore and analyze finite element parameters such as contact pressure and stress distribution on ACL in response to complex loading conditions. Moreover, various cases studied such as cases involving and uninvolved ligament in order to obtain and analyze the stress and contact pressure relationship between ACL, meniscus and cartilage. It is known that the contact and friction caused by the ACL wrapping around the bone during knee motion played the role of transferring the force from the ACL to the bone, and had a direct effect on the stress distribution of the ACL. Thus, the project lead to better understand the mechanism of injury, to improve the design of ACL reconstruction using suitable material and optimizing rehabilitation protocols by investigation of contact pressure with and without ACL.

Keywords — Anterior Cruciate Ligament, knee joint model, finite element analysis, stress distribution, meniscus and cartilage contact pressure