

Biomechanical Study of a Type II Superior Labral Anterior to Posterior Lesion in the Glenohumeral Joint Using Finite Element Analysis

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Abstract : The SLAP lesion (Superior Labral Anterior to Posterior) involves the labrum, causing pain and mobility problems in the glenohumeral joint. This injury is common in athletes practicing sports that requires throwing or those who receive traumatic impacts on the shoulder area. This paper determines the biomechanical behavior of soft tissues of the glenohumeral joint when type II SLAP lesion is present. This pathology is characterized for a tear in the superior labrum which is simulated in a 3D model of the shoulder joint. A 3D model of the glenohumeral joint was obtained using the free software Slice. Then, a Finite Element analysis was done using a general purpose software which simulates a compression test with external rotation. First, a validation was done assuming a healthy joint shoulder with a previous study. Once the initial model was validated, a lesion of the labrum built using a CAD software and the same test was done again. The results obtained were stress and strain distribution of the synovial capsule and the injured labrum. ANOVA was done for the healthy and injured glenohumeral joint finding significant differences between them. This study will help orthopedic surgeons to know the biomechanics involving this type of lesion and also the other surrounding structures affected by loading the injured joint.

Keywords : biomechanics, computational model, finite elements, glenohumeral joint, superior labral anterior to posterior lesion

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