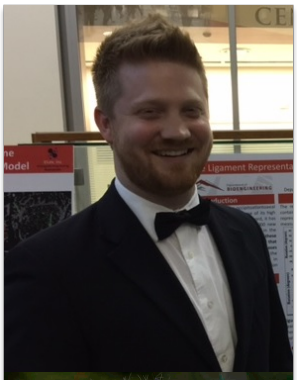

EFFECTIVE REPRESENTATION OF LIGAMENTS USING SPRINGS IN AN OCCIPITOATLANTOAXIAL FEM

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The occipitoatlantoaxial is the upper portion of the cervical spine consisting of the occiput and the vertebra C1 and C2. These vertebrae are inherently unstable on their own; however, numerous surrounding ligaments and cartilage provide the necessary stability. Computational modeling provides the ability to study the biomechanics and provide information for correcting damage from injury and disease. Our aim is to develop a functioning model that replicates the motion and end results of physical experiments by matching it to physical data from previous research. Particularly we tested the effectiveness of springs in representing ligaments during flexion, extension, lateral bending, and rotation movements. To build the model segmentation of the computer tomography (CT) was used to construct a volumetric meshed surface. Material properties were then added to bone and cartilage as well as other soft tissues. This finite element model (FEM) replicates the angles of motion of the cervical spine when a force is applied. Validation of this model was done by comparing the results to adult values taken from physical experiments measuring the angle of motion. This model has importance in future work for understanding and treating pediatric patients because it will provide the ability to develop customized treatments to restore proper biomechanical function to their cervical spine.