Weight, Center of Gravity and Principal Moments of Inertia of the Human Body

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OBJECTIVE

To directly measure the weight, center of gravity (CG) and principal moments of inertia (MOI) of the segmented human body using well established methods.

INTRODUCTION

Mass properties of the human body are essential to understanding the envelope of dynamic stresses within which the human body can operate without injury. In order to accurately simulate the dynamics of the human body in impact and acceleration environments, valid mass properties data for the human body are necessary. A great deal of research has been performed on characterizing the inertial properties of cadavers and living humans.

METHODS

Two male, embalmed cadavers (73 in, 247 lbs.; 68 in, 148 lbs.) were segmented into 16 segments. The segments' mass properties (weight, CG and principal MOIs) were measured at The Ohio State University's Injury Biomechanics Research Laboratory. The head, thorax, abdomen, pelvis, and left-side limbs (upper arm, lower arm, hand, thigh, lower leg, and foot) were directly measured using proven equipment and methods[1].

RESULTS AND DISCUSSION

The weight, CG, and principal MOIs were directly measured from human cadaver segments. The segment coordinate axis system, segment length, and proximal and distal widths and depths of the segment were also determined. The data will be compared with previous studies[2, 3] weight, CG, principal MOIs, regression equations, and mass distribution ratios with respect to segment CG.

REFERENCES

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