Epicardial Strains in Normal Passive Mouse Left Ventricle

Mice are valuable models for the study of cardiovascular disease but there is no quantitative data for pressure-strain relationships in the normal heart. The objective of our research was to determine cardiac left ventricular (LV) pressure-strain relationships of a C57/BL6 mouse heart. A custom fabricated balloon was inserted into the LV through the mitral valve of an arrested, isolated heart. Surface markers were placed on the epicardium of the lateral wall. Marker displacements were computed from images captured as the balloon was inflated. Strains were computed and plotted against the LV pressure. Similar to other species, the strains should be nonlinear with decreasing stiffness from circumferential to longitudinal directions. The principal strains should align with the epicardial fiber direction. These pressure-strain relationships will serve as control data for investigation of the study of the hypertrophic heart.