Computational Model of Left Ventricle Infarct Remodelling during Passive Filling Phase

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Abstract

Myocardial infarction causes part of the left ventricle muscle to not receive adequate oxygen supply and may cause muscle remodelling. Myocardium remodelling affects the blood pumping efficiency of the heart. In this paper, a model to describe myocardial remodelling during myocardial infarction is coupled with myocardium material model through multiplicative decomposition of the deformation gradient. Passive filling simulations of a normal and abnormal left ventricles are done and it was found that the muscle stiffness is increased in abnormal LV, which is indicated by 0.19% difference in the end-diastolic volume. The tissue displacement is also distributed asymmetrically in the LV, which further affects the stiffness difference. Improvements of the simulation to include FSI and full cycle simulation can further enlight the capability of the model to predict myocardium infarct remodelling.

Index Terms: *left ventricle, myocardium remodelling, passive filling phase, oxygen transport*