

عنوان مقاله:

computational investigation of hemodynamic parameters in PULMONARY ARTERIAL HYPERTENSION IN A
PATIENT-SPECIFIC MODEL

محل انتشار:

بیست و ششمین همایش سالانه بین المللی انجمن مهندسان مکانیک ایران (سال: 1397)

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خلاصه مقاله:

Prior clinical studies in pulmonary arterial hypertension (PAH) mostly have focused on distal pulmonary vascular resistance, its contribution to the disease process, and its response to different therapies. Biomechanical factors such as shear stress and velocity, however, are well known to affect endothelial health and dysfunction in other parts of the vasculature. In this study, regarding this belief that stress alterations presumably lead to endothelial dysfunction and consequently PAH progression, the role of mechanical parameters in the modification of wall shear stress have been investigated by a combination of two different methods: CT scan and computational fluid dynamics (CFD). Blood has been considered as a Newtonian fluid with laminar flow in the main large pulmonary artery. Three-dimensional models constructed with CT images revealed higher diameter in PAH patient than control (3.1 vs. 2.7 cm). Maximum wall shear stress obtained from the simulation in a normal artery with a normal pulse pressure was 9.75×10^{-5} versus 1.300×10^{-4} (N/mm²) in PAH model. One of the most important purposes of this study is an investigation into the interaction between anatomical and biomechanical properties changes and their results in pathogenesis and progression in PAH and endothelial dysfunction. These data can be a basis for further clinical research.

کلمات کلیدی:

Computational fluid dynamics, pulmonary arterial hypertension, wall shear stress, Newtonian fluid. CT scan

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