

عنوان مقاله:

Simulation of non-Newtonian blood flow through femoral artery bifurcation with a moderate arteriosclerosis

محل انتشار:

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خلاصه مقاله:

In this study, a fluid–structure interaction (FSI) simulation of the blood flow in femoral artery with a small occlusion is presented. For a more accurate simulation of the real conditions, computerized tomography (CT) scan was used to obtain a 3-D model of leg blood vessels, while the vessel was modeled as an elastic isotropic wall. By assuming a heartbeat period of 0.5s, the inlet condition was considered as a time-dependent pulse using a non-Newtonian flow model. Blood flow was assumed nonlinear and incompressible and Carreau model was used for blood rheological model. By considering unstable blood flow at the inlet, the involved hemodynamic parameters are velocity profile, vortices shapes, pressure drop and streamlines. Furthermore, to determine the relationship between flow geometry and the vascular wall, wall shear stress (WSS) was calculated. By taking the real geometry of the vessel and fluidity of blood into account, comparison of computational results indicated a significant difference in velocity distribution and shear stress depending on whether the fluid-structure interaction is considered Newtonian or non-Newtonian. The results showed that employing Newtonian models for the blood flow does not lead to promising results at occluded areas and beyond them.

کلمات کلیدی:

D numerical simulation; femoral artery bifurcation, vascular occlusion and non-Newtonian fluid-3

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