Abstract

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Effect of Non-Newtonian Viscosity on the Hemodynamics of Cerebral Aneurysms

Blood hemodynamics studies is becoming a significant ol for facilitating diagnosis and rupture risk assessment of cerebral aneurysms. The purpose of this study is to present a comparative study between Newtonian and non-Newtonian blood viscosity models for simulating the hemodynamic wal shear stres (WS) of cerebral aneurysms. The non-Newtonian blod viscosity was modeled using the Careau-Yasuda nonlinear model. Two realistic cerebral aneurysm models, derived from 3D angiography imaging, were studied and simulated via computational fluid dynamics solver based on finite volume method, with a pulsating sinusoidal waveform boundary conditions. The maximum wal shear streses were found at he aneurysm's neck and apex, the inlet arteriole recorded an average wall shear stress and as for the blebs and tips the wall shear stress values were remarkably low. The comparison showed that non-Newtonian blood viscosity model showed a lower range of WSS than of the Newtonian model, which provides more accuracy for predicting aneurysm rupture.