Investigation of the Geometry Effect on the Wall Shear Stress on the Aneurysm Wall

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The variation of wall shear stress (WSS) is hypothesized as a major cause for aneurysm rupture. Objective of many studies is to examine the critical values of WSS, that can lead to aneurysm hemorrhage. Following this aim the authors perform numerical simulations in ANSYS Workbench 14. Ideal aneurysm geometries are constructed in commercial package AN-SYS Model Designer. Three main morphological factors are varied: diameter of parent vessel , aneurysm diameter and aneurysm height . Using numerical simulations (in commercial code ANSYS Fluent), contours of both total pressure and velocity magnitude in the symmetry plane , as well as contours of WSS on the parent vessel, and aneurysm walls are obtained. By applying commercial code STATISTIKA a special attention is paid on the WSS on aneurismal wall and its 25th quartile. Regression equations are derived for the WSS on aneurysm wall depending on the above geometric parameters.