COMPUTATIONAL FLUID DYNAMICS (CFD) OF ANEURYSMATIC BLOOD VESSEL

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ABSTRACT

Blood flow dynamics plays an important role in the development of aneurysms. An aneurysm is a permanent ballooning in the wall of an artery. The pressure of blood passing through can force part of a weakened artery to bulge outward, forming a thin-skinned blister. This study is to analyze the Computational Fluid Dynamics (CFD) of aneurysmatic blood vessel in two representative models of a terminal aneurysm of the basilar artery, and compares their wall shear stress, pressure, velocity and streamline flow with that of a healthy basilar artery. Aneurysm models are investigated numerically, with geometric features defined by β =0 deg and β =23.2 deg, where β is the tilt angle of the aneurysm sac with respect to the basilar artery. The arterial wall was assumed to be elastic, isotropic, incompressible and homogeneous. The flow was assumed to be laminar, Newtonian, and incompressible. The fluid and structure models were solved with the FLUENT-ANSYS 12.1. The pressure and wall shear stress on the aneurysm wall exhibit large spatial variations for the model. Aneurysm model 2- β = 23.2 deg has higher and stable vorticity than aneurysm model 1- β = 0 deg. For healthy basilar artery model there was no vortices. The aneurysm model 2- β = 23.2 deg also has higher wall shear stress and pressure value than aneurysm model 1- β = 0 deg in the aneurysm sac.

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"I declared that this thesis is the result of my own work except the ideas and summaries which I have clarified their sources. The thesis has not been accepted for any degree and is not concurrently submitted in candidature of any degree."

Signed : .....

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