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Flow patterns and shear stress waveforms in intracranial aneurysms: The effect of pulsatility[1] FOTIS SOTIROPOULOS, TRUNG LE, IMAN BORAZJANI, University of Minnesota, SAFL TEAM — The wall shear stress on the dome of intracranial aneurysms has been hypothesized to be an important factor in aneurysm pathology and depends strongly on the hemodynamics inside the dome. The importance of patient-specific geometry on the hemodynamics of aneurysms has long been established but the significance of patient-specific inflow waveform is largely unexplored. In this work we seek to systematically investigate and quantify the effects of inflow waveform on aneurysm hemodynamics. We carry out high resolution numerical simulations for an anatomic intracranial aneurysm obtained from 3D rotational angiography (3DRA) data for various inflow waveforms. We show that both the vortex formation process and wall-shear stress dynamics on the aneurysm dome depend strongly on the characteristics of the inflow waveform. We also present preliminary evidence suggesting that a simple non-dimensional number (named the Aneurysm number), incorporating both geometry and inflow waveform effects, could be a good qualitative predictor of the general hemodynamic patterns that will arise in a given aneurysm geometry for a particular waveform.

[1]Minnesota Supercomputing Institute, National Science Foundation and National Institutes of Health

Trung Le
University of Minnesota

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