Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Numerical simulations of post-surgical flow and thrombosis in basilar artery aneurysms SANTHOSH SESHADHRI, Department of Neurosurgery, Medical College of Wisconsin, Milwaukee, WI, USA, MICHAEL LAWTON, Department of Neurological Surgery, University of California, San Francisco, San Francisco, CA, USA, LOIC BOUSSEL, Department of Radiology, Louis Pradel Hospital, Creatis- LRMN, Lyon, France, DAVID SALONER, Department of Radiology and Biomedical Imaging, University of California, San Francisco, San Francisco, CA, USA, VITALIY RAYZ, Department of Neurosurgery, Medical College of Wisconsin, Milwaukee, WI, USA — Surgical treatment of basilar artery aneurysms presents a major challenge since it is crucial to preserve the flow to the vital brainstem perforators branching of the basilar artery. In some cases, basilar aneurysms can be treated by clipping vessels in order to induce flow reduction and aneurysm thrombosis. Patient-specific CFD models can provide guidance to clinicians by simulating postoperative flows resulting from alternative surgeries. Several surgical options were evaluated for four basilar aneurysm patients. Patient-specific models were generated from preoperative MR angiography and MR velocimetry data and modified to simulate different procedures. The Navier-Stokes equations were solved with a finite-volume solver Fluent. Virtual contrast injections were simulated by solving the advection-diffusion equation in order to estimate the flow residence time and determine thrombus-prone regions. The results indicated on procedures that reduce intra-aneurysmal velocities and flow regions which are likely to become thrombosed. Thus CFD modeling can help improve the outcome of surgeries altering the flow in basilar aneurysms.

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Date submitted: 28 Jul 2015 Electronic form version 1.4