Abstract Submitted
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Coils vs stents: CFD investigation of the mechanisms of healing for two endovascular therapies in cerebral aneurysms[1] MICHAEL BARBOUR, LAUREL MARSH, Univ of Washington, FANETTE CHASSAGNE, University of Washington, VENKAT KESHAV CHIVUKULA, Univ of Washington, CORY KELLY, SAM LEVY, MICHAEL LEVITT, LOUIS KIM, Univ of Washington Medical Center, ALBERTO ALISEDA, Univ of Washington — Cerebral aneurysm treatment seeks to avoid the risk of rupture by excluding the aneurysmal sac from the circulation. Coiling and stenting are two forms of minimally invasive endovascular treatment that, while increasingly popular, present a non-negligible risk of incomplete embolization of the aneurysm. The placement of flow-diverting stents (FDS) or coils leads to aggregation of activated platelet and thrombus formation. A stable thrombus that fully occludes the aneurysm marks a successful treatment as it excludes the aneurysmal sac from hemodynamic stresses and minimizes the risk of rupture. There is currently no accurate method to predict the outcome of either endovascular therapy. We present in silico studies that show the hemodynamics changes, pre- to post-treatment, for both forms of treatment trend in opposite directions. We consider the treatment types separately to find certain changes in Eulerian variables are statistically different between the successful and unsuccessful treatments. The successfully coiled aneurysm cases were marked by a higher overall increase in the neck plane shear than the failed cases. While one of the most significant metrics for predicting a successful FDS treatment is the change in flowrate entering the aneurysm during systole.

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