E-194 PATIENT-SPECIFIC HEMODYNAMICS PREDICT ENDOVASCULAR COILING OUTCOMES FOR INTRACRANIAL ANEURYSMS

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10.1136/neurintsurg-2020-SNIS.225

Introduction Embolic coils are a preferred endovascular treatment technique for intracranial aneurysms, but approximately 34% of these treatments are unsuccessful, requiring re-treatment. To better understand why endovascular treatment fails, we used computational fluid dynamics (CFD) simulations to determine the changes in hemodynamics factors after coil embolization that were associated with treatment success versus those that led to failure. We incorporated patient-specific intravascular blood flow measurements as boundary conditions, which has been shown to improve simulation accuracy.

Materials and Methods Adult patients presenting with unruptured intracranial aneurysms treated with coil embolization were enrolled. 3D-rotational angiograms taken before and immediately after treatment were used to create computational models of the patients' vasculature. Intraoperative blood velocity and blood pressure measurements were obtained before and immediately after coil embolization by placing a dual-sensor microwire (ComboWire) in the proximal segment of the parent vessel. These measurements were incorporated as patient-specific boundary conditions for the CFD simulations to compute hemodynamics conditions before and after treatment. Hemodynamics variables including inflow rate (Q), wall shear stress (WSS), and wall shear stress gradient (WSSG) were calculated within each aneurysm. Treatment success or failure was determined by evaluating each patient's most recent follow-up angiogram, and this outcome was then correlated to the changes in hemodynamics

Abstract E-194 Figure 1 Patient-specific computational fluid dynamics modelling (CFD) of changes in wall shear stress (WSS) in an

aneurysm. This statistical analysis aims to determine associations between immediate changes in post-treatment hemodynamics variables and treatment outcomes.

Results Sixteen patients were included (table 1). Regardless of long-term treatment outcome, immediate post-treatment reductions were observed in Q, WSS and WSSG. Preliminary analyses suggest that an increase in shear stress at the aneurysm neck was associated with successful long-term outcome, representative of the significant redirection of blood flow velocity by the coil mass required to prevent aneurysm recanalization. Final multivariate analyses will be presented.

Conclusion CFD simulations of aneurysm hemodynamics using patient-specific imaging and boundary conditions were performed in a large cohort of patients treated with coil embolization. Increases in neck plane shear and redirection of blood flow found immediately post-coil embolization have the potential to predict long-term treatment success.

Disclosures S. Levy: None. L. Marsh: None. M. Barbour: None. K. Prijoles: None. D. Lim: None. H. Haughn: None. C. Kelly: None. F. Chassange: None. G. Barros: None. D. Bass: None. A. Aliseda: None. M. Levitt: 1; C; Philips Volcano. L. Kim: None.

Abstract E-194 Table 1 Patient clinical and demographic data

N	Age	Sex	Hx Smoking	Hx HTN	Aneurysm Location	Aneurysm Size (mm)
1	36	F	No	No	R ICA cavernous	5.6
2	73	F	Yes	Yes	L ICA ophthalmic	10.0
3	48	M	No	Yes	L ICA clinoid	4.5
4	74	F	Yes	Yes	L ICA PCOM	11.5
5	47	M	Yes	No	BA R AICA	6.5
6	60	M	Yes	No	BA terminus	11.0
7	50	F	Yes	No	L ICA ophthalmic	5.2
8	58	F	No	Yes	BA terminus	6.0
9	61	M	No	No	L ICA ophthalmic	5.3
10	69	F	Yes	No	BA L SCA	5.8
11	56	F	Yes	Yes	R ICA ophthalmic	11.8
12	40	F	No	No	L ICA PCOM	8.5
13	44	F	No	No	L ICA clinoid	5.8
14	69	M	Yes	Yes	R ICA terminus	5.6
15	55	F	Yes	Yes	L ICA ophthalmic	5.8
16	52	F	No	Yes	L ICA ophthalmic	6.4

E-195 A MIXED REALITY SPATIAL COMPUTING FRAMEWORK FOR PREPROCEDURAL EVALUATION OF CEREBRAL ANEURYSMS: APPROACH AND PRELIMINARY RESULTS

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10.1136/neurintsurg-2020-SNIS.226

Introduction/Purpose Mixed Reality (MxR) is an emerging technology that makes seamless connections between virtual space and the real world by superimposing computer-generated information onto the real-world environment. MxR can provide additional information in a more intuitive and natural way than alternative information-delivery methods