Periprocedural complications trended higher in the SAC group (WEB 0% vs. stent-coil 13%, p=0.089, Fisher Exact test). Conclusion: Mid-term complete and adequate occlusion rates were similar between patients treated with WEB and SAC. Given the comparable outcomes, there may be equipoise in treatment options for WNBAs.


Abstract P-020

MODELING THE MECHANICAL MICROENVIRONMENT OF COILED CEREBRAL ANEURYSMS

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Background: Successful occlusion of cerebral aneurysms using coil is embolization contingent upon stable thrombus formation, and the quality of the thrombus depends upon the biomechanical environment. Thus, the goal of this study is to investigate how coil embolization alters the mechanical microenvironment within the aneurysm dome.

Method: Inertialess particles were injected in 3-dimensional, computational simulations of flow inside patient aneurysms using patient-specific boundary conditions. Coil embolization was simulated as a homogenous porous medium of known permeability and inertial constant. Lagrangian particle tracking was used to calculate the residence time and shear stress history for particles in the flow before and after treatment.

Results: The percentage of particles entering the aneurysm dome correlated with the neck surface area before and after treatment (pretreatment: R² = 0.831, P < 0.001; posttreatment: R² = 0.638, P < 0.001). There was an inverse relationship between the change in particles entering the dome and coil packing density (R² = 0.600, P < 0.001). Following treatment, the particles with the longest residence times tended to remain within the dome even longer while accumulating lower shear stress. (A) The scatter plot shows all particles entering the aneurysm dome graphed by their respective residence time (RT) and shear stress history (SH) from a representative patient before and after treatment. Treatment led to a significant reduction in the SH:RT ratio across all subjects from a median of 0.63 to 0.13 (B. box plot, Z = 3.134, P = 0.002). Additionally, a significant correlation was observed between the treatment effect on residence time and the ratio of the neck surface area to porosity (R² = 0.390, P = 0.007).

Conclusions: The results of this study suggest that coil embolization triggers clot formation within the aneurysm dome via a low shear stress-mediated pathway. This hypothesis links independently observed findings from several benchtop and clinical studies, which have found that acute clots associated with metal coils are predominantly composed of fibrin and erythrocytes, and it provides a plausible explanation for why pharmacological platelet inhibition does not suppress intraluminal clot formation following endovascular embolization.

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Abstract P-021

INTERIM SAFETY AND OCCLUSION OUTCOMES OF ENDOVASCULAR TREATMENT OF VERY SMALL INTRACRANIAL ANEURYSMS IN THE STERLING REGISTRY

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Background: Successful occlusion of cerebral aneurysms using coil is embolization contingent upon stable thrombus formation, and the quality of the thrombus depends upon the biomechanical environment. Thus, the goal of this study is to investigate how coil embolization alters the mechanical microenvironment within the aneurysm dome.

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Results: The percentage of particles entering the aneurysm dome correlated with the neck surface area before and after treatment (pretreatment: R² = 0.831, P < 0.001; posttreatment: R² = 0.638, P < 0.001). There was an inverse relationship between the change in particles entering the dome and coil packing density (R² = 0.600, P < 0.001). Following treatment, the particles with the longest residence times tended to remain within the dome even longer while accumulating lower shear stress. (A) The scatter plot shows all