Abstract P-019

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.

Disclosures
A. Kashkoush: None. A. Desai: None. M. Davidson: None. R. Ache: None. A. Mahapatra: None. T. Patterson: None. N. Moore: None. M. Bain: 2; C; Stryker Corporation.

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: R^2 = 0.831, P < 0.001; posttreatment: R^2 = 0.638, P < 0.001). There was an inverse relationship between the change in particles entering the dome and coil packing density (R^2 = 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 (R^2 = 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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Abstracts

Introduction There are no established guidelines and considerable differences in practice patterns in the treatment of very small intracranial aneurysms. We present real-world safety and occlusion outcomes of endovascular treatment of very small aneurysms with Galaxy and MicrusFrame coils from the STERLING registry.

Materials and Methods STERLING (NCT03642639) is a prospective, global, real-world registry of brain aneurysm treatment with Galaxy and MicrusFrame coils (Cerenovus, Irvine, CA). Very small (<4 mm) intracranial aneurysms and all other aneurysms (≥4 mm) with available core lab imaging data from STERLING were included in this interim analysis.

Results Target aneurysms in STERLING ranged in size from 2.40 to 31.30 mm. Twenty-four very small and 375 other aneurysms were identified, with an average maximum diameter of 3.67 ± 0.490 mm and 7.42 ± 3.295 mm, respectively. Aneurysm characteristics and treatment outcomes are compared in table 1. Notable differences included lower age and lower percentage of females in the very small aneurysm cohort. Treatment of very small aneurysms required shorter procedure (1.44 ± 0.621 vs. 1.70 ± 1.220 hours) and less total fluoroscopy time (40.3 ± 15.34 vs. 47.2 ± 27.30 minutes), although the hospital stay was longer (8.8 ± 8.65 vs. 7.5 ± 7.17 days). Mean packing density in the <4 mm cohort was 34.2 ± 17.63%. Complete and adequate occlusion (modified Raymond-Ray I and I or II) rates for the very small aneurysms were 66.7% (16/24) and 87.5% (21/24) post procedure, 88.9% (8/9) complete and adequate at 6 months, and 75% (3/4) complete and 100.0% (4/4) adequate occlusion at the 1-year follow up, with a 100% (5/5) good mRS at 1 year for unruptured cases. There were no procedural complications and no device-related SAEs though a 1.5 year follow up. There are no retreatments in the very small aneurysms. Comparative results for the ≥4 mm cohort are included in table 1.

Conclusion Very small aneurysms, ranging in size from 2.40 to 3.90 mm, constituted 6% (24/399) of the STERLING registry cases included in this interim analysis. Treatment with Galaxy and MicrusFrame coils showed very high rates of adequate occlusion and good clinical outcome, with no retreatments and an excellent safety profile.

Disclosures B. Jankowitz: 2; C; Stryker, Medtronic. 6; C; Medtronic. R. De Leacy: 2; C; Imperial Care, Cerenovus, Siemens Healthineers, Stryker Neurovascular, Penumbra. 4; C; Synchon, Endostream, QA’pel Medical, Spartan Micro, Vastrax. A. Puri: 1; C; Medtronic Neurovascular, Stryker Neurovascular, Cerenovus. 2; C; Medtronic Neurovascular, Stryker Neurovascular, Cerenovus, Mirovention, Agile, Merit Medical, Corindus, QA’pel, Arsenal Medical, Imperative Care, Perfuze Medical. 4; C; InNeuroCo Inc, Galaxy Therapeutics, Agile Medical, Perfuze Medical, NTI. R. Starke: 1; C; NREF, Joe Niekro Foundation, Brain Aneurysm Foundation, Bee Foundation, NIH, Medtronic. 2; C; Medtronic, Penumbra, Abbott, InNeuroCo, Cerenovus. 6; C; Medtronic, Penumbra, Abbott, InNeuroCo, Cerenovus. A. Yoo: 1; C; Medtronic, Cerenovus, Penumbra. 2; C; Penumbra, Cerenovus. 4; C; Insera Therapeutics. F. Gariel: 2; C; Qynapse. S. Jahshan: None. Z. Kulsewar: None. C. Schirmer: 1; C; Penumbra. 4; C; Neurotechnology Investors. C. Chivot: None. J. Howington: 6; C; Chemence Medical. G. Pero: None. T. Yao: 2; C; Medtronic. 6; C; Medtronic, Microvention. A. Polilka: 2; C; Deuph Synthes. A. Evans: None. O. Zaidat: 1; C; Stryker, Medtronic, Cerenovus, Penumbra, Genentech. 2; C; Cerenovus, Stryker, Penumbra, Medtronic, Neuravi, NIH StrokeNet, Codman. 3; C; Cerenovus, Stryker, Penumbra, Medtronic. 4; C; Galaxy Therapeutics LLC. 6; C; NIH, Codman, Stryker, Penumbra, Medtronic Neurovascular.

Abstract P-021 Table 1

Comparative results for very small aneurysms vs. all other aneurysms

<table>
<thead>
<tr>
<th>Aneurysms</th>
<th>Very Small</th>
<th>All Other Aneurysms</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at consent (mean ± SD, years)</td>
<td>56.8 ± 13.83</td>
<td>58.8 ± 11.45</td>
</tr>
<tr>
<td>Female</td>
<td>15/24 (62.5%)</td>
<td>269/375 (71.7%)</td>
</tr>
<tr>
<td>Max aneurysm diameter (mean ± SD, mm)</td>
<td>3.67 ± 0.490</td>
<td>7.2 ± 3.295</td>
</tr>
<tr>
<td>Min, max</td>
<td>2.40, 3.90</td>
<td>4.00, 11.30</td>
</tr>
<tr>
<td>Rupture Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ruptured aneurysm</td>
<td>8/24 (33.3%)</td>
<td>106/375 (28.3%)</td>
</tr>
<tr>
<td>Un-ruptured aneurysm</td>
<td>16/24 (66.7%)</td>
<td>269/375 (71.7%)</td>
</tr>
<tr>
<td>Location of aneurysm</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anterior circulation</td>
<td>19/24 (79.2%)</td>
<td>322/375 (85.9%)</td>
</tr>
<tr>
<td>Posterior circulation</td>
<td>5/24 (20.8%)</td>
<td>53/375 (14.1%)</td>
</tr>
</tbody>
</table>

| Type of aneurysm, n/N (%) | | |
| Sacular | 24/24 (100.0%) | 366/375 (97.6%) |
| Fusiform | 0 | 8/375 (2.1%) |
| Dissecting | 0 | 1/375 (0.3%) |
| Side Wall | 9/24 (37.5%) | 170/372 (45.7%) |
| Bifurcation | 15/24 (62.5%) | 202/372 (54.3%) |
| Wide neck | 19/24 (79.2%) | 295/375 (78.7%) |
| Narrow neck | 5/24 (20.8%) | 80/375 (21.3%) |
| Small (< 5 mm) | 24/24 (100.0%) | 69/375 (18.4%) |
| Medium (5 to <13 mm) | 0 | 286/375 (76.3%) |
| Large (≥ 13 mm) | 0 | 20/375 (5.3%) |
| Procedure characteristics | | |
| Packing density (mean% ± SD) | 34.2 ± 17.65 | 26.8 ± 11.03 |
| Length of hospital stay (days) | 8.8 ± 6.55 | 7.5 ± 7.17 |
| Duration of procedure (hours) | 1.44 ± 0.621 | 1.70 ± 1.220 |
| Total fluoroscopy time (minutes) | 40.3 ± 15.34 | 47.2 ± 27.30 |
| Intraprocedural safety events | | |
| Rupture | 0/24 (0.0%) | 3/375 (0.8%) |
| Symptomatic thromboembolism | 0/24 (0.0%) | 2/375 (0.5%) |
| Device-related SAEs | | |
| Up to 1 year (365 days) | 0/24 (0.0%) | 8/333 (2.4%) |
| Up to 1.5 years (545 days) | 0/24 (0.0%) | 8/333 (2.4%) |
| Aneurysm retreatments | | |
| 1 year (365 days) | 0/4 (0.0%) | 11/111 (10.0%) |
| 1.5 years (545 days) | 0/5 (0.0%) | 11/111 (9.9%) |
| Adequate occlusion without retreatment | | |
| Post-index/staged procedure | 21/24 (87.5%) | 304/371 (81.9%) |
| 6-Month follow up (+/-3 months) | 8/9 (88.9%) | 147/153 (96.1%) |
| 1-year follow-up (-3/+6 months) | 4/4 (100.0%) | 99/104 (95.2%) |
| Complete occlusion without retreatment | | |
| Post-index/staged procedure | 16/24 (66.7%) | 206/371 (55.5%) |
| 6-Month follow up (+/-3 months) | 8/9 (88.9%) | 118/153 (77.1%) |
| 1-year follow-up (-3/+16 years) | 3/4 (75.0%) | 73/104 (70.2%) |
| mRS 0-2 at 1-year follow-up for unruptured aneurysms | 5/5 (100.0%) | 96/98 (98.0%) |