Abstract O-022 Figure 1 Hemodynamic difference between general flow condition and patient specific condition

computational fluid dynamics (CFD). In previous studies, we have used the same inflow condition to simulate blood flow regardless of patients' differences, although the heartbeat cycle differed from patient to patient. In this study, we extracted the patient-specific heartbeat cycle and blood flow velocity from four-dimensional digital subtraction angiography (4D-DSA) data that contain spatial and temporal information of contrast media. Finally, we performed CFD simulations and evaluated the effect of patient-specific inflow conditions.

Materials and methods Data of a 73-year-old man with hypertension were analyzed. We extracted the patient-specific heartbeat cycle and blood flow velocity from 4D-DSA data. Then, we performed CFD simulations using ANSYS CFX 18.1 under both general inflow conditions (healthy adult) and patient-specific inflow conditions extracted from 4D-DSA to reproduce the angiographic images. We calculated the cardiac cycle duration and the amplitude of voxel intensity values at one point on the vessel centerline over two cardiac cycles, for both the CFD simulation and 4D-DSA data sets. To assess the accuracy of the patient-specific flow condition extraction method, we compared the calculation results of the cardiac cycle duration and the amplitude obtained from both data sets. Finally, we compared the wall shear stress (WSS) differences caused between general inflow condition and patient-specific condition.

Results The 4D-DSA analysis gave a heartbeat cycle duration of 1.11 s and an intensity amplitude of 0.856. The CFD simulation under general inflow condition gave a cycle duration of 0.825 s, and an intensity amplitude of 0.879. In contrast, the CFD simulation under patient-specific inflow condition gave a cycle duration of 1.03 s and an intensity amplitude of 0.854. The cycle duration error difference between 4D-DSA analysis and CFD simulation results under general inflow condition was 3.90%, and between intensities 25.3%. In contrast, the cycle duration error between 4D-DSA and CFD simulation under patient-specific condition was 0.945%, and the intensity amplitude error 7.24%. In addition, we found that the WSS value using general conditions was overestimated compared with that using patient-specific condition in this case (see figure 1).

Conclusions We performed CFD simulation using patient-specific heartbeat cycle and blood flow velocity extracted from 4D-DSA data. The result showed that the CFD simulation under patient-specific inflow condition could simulate the actual blood flow more accurately.

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O-023

STENT-ASSISTED COILING OF CEREBRAL ANEURYSMS: MULTI-CENTER ANALYSIS OF RADIOGRAPHIC AND CLINICAL OUTCOMES IN 659 PATIENTS

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Introduction Endovascular stent-assisted coiling approach for the treatment of cerebral aneurysms is evolving rapidly with the availability of new stent devices. It remains unknown how each type of stent affects the safety and efficacy of the stent-coiling procedure.

Methods This study compared the outcomes of endovascular coiling of cerebral aneurysms using Neuroform (NEU), Enterprise (EP), and Low-profile Visualized Intraluminal Support (LVIS) stents. Patient characteristics, angiographic results using the Raymond-Roy grade scale (RRGS), clinical outcomes and procedural complications were analyzed in our study.

Results 659 patients with 670 cerebral aneurysms treated with stent-assisted coiling (NEU, n=182; EP, n=158; LVIS, n=330) were retrospectively collected from six academic centers. Patient characteristics included mean age 56.3 ± 12.1 years old, female prevalence 73.9% and aneurysm rupture on initial presentation of 18.8%. We found differences in complete occlusion on baseline imaging, defined as RRGS I, among the three stents: LVIS 64.4%, 210/326; NEU 56.2%, 95/169; EP 47.6%, 68/143; $p=0.008$. The difference of complete occlusion on 10.5 months (mean) and 8 months (median) angiographic follow-up remained significant: LVIS 84%, 251/299; NEU 78%, 117/150; EP 67%, 83/123; $p=0.004$. There were 7% (47/670) intra-procedural complications and 11.5% (73/632) post-procedural related complications in our cohort.

Conclusions The type of stent used for stent-assisted coiling affects immediate and long-term angiographic outcomes. Randomized prospective trials comparing the different types of stents are warranted.

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0-024 COMPARISON BETWEEN OUTCOMES OF ANTERIOR AND POSTERIOR CEREBRAL CIRCULATION ANEURYSMS IN THE SMART REGISTRY COHORT

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Background Endovascular treatment of cerebral aneurysms in the posterior circulation poses a challenge because of the higher rate of wide-necked aneurysms and presentation with rupture. In this study, we compare the baseline characteristics and outcomes of patients with posterior circulation aneurysms treated with novel second-generation coils in the SMART registry.

Methods SMART is a phase 4, multicenter, prospective, registry that enrolled patients with anterior and posterior circulation cerebral aneurysms (both ruptured and unruptured) who underwent endovascular treatment using Penumbra SMART™ Coils. Collected data included baseline clinical and angiographic characteristics at presentation. Primary and secondary end points were immediate angiographic occlusion, periprocedural complications, recanalization and retreatment rates and mortality at 1-year follow up. We compared the above variables between anterior and posterior circulation aneurysms.

Results Of a total of 906 patients treated in the SMART registry, 173 (19.1%) had posterior circulation aneurysms. In comparison to patients with anterior circulation aneurysms, patients with aneurysms in the posterior circulation were older (mean age 61.7 vs. 59.3 years, P 0.017) and more likely to present with rupture (38.7% vs. 30.3%, P 0.032). Posterior circulation aneurysms were more likely to be wide-necked (defined as an aneurysm with a dome-to-neck ratio less than 2.0 and/or a neck length of 4 mm or more). No significant difference was found in the rate of successful

embolization at initial procedure (Raymond Class I), serious device-related adverse effects within 24 hours, one-year recanalization and one-year retreatment between both groups (table 1).

Abstract 0-024 Table 1 Comparison between anterior and posterior circulation aneurysms

Baseline characteristics	Posterior circulation aneurysm patients (N=173)	Anterior circulation aneurysm patients (N=733)	P-value
Age, Mean SD	61.7 11.6	59.3 12.8	0.017
Female, % (n/N)	78.6% (136/173)	73.9% (542/733)	0.203
Ruptured aneurysm, % (n/N)	38.7% (67/173)	30.3% (222/733)	0.032
Aneurysm Size % (n/N)			0.285
Small (<11mm)	86.1% (149/173)	89.5% (656/733)	
Large (11 to 25 mm)	13.3% (23/173)	10.4% (76/733)	
Giant (>25mm)	0.6% (1/173)	0.1% (1/733)	
Wide-Neck% (n/N)	72.2% (117/162)	59.9% (439/733)	0.002
Stent-Assisted Coiling % (n/N)	38.2% (66/173)	36.2% (265/733)	0.624
Balloon-Assisted Coiling % (n/N)	16.8% (29/173)	20.6% (151/733)	0.255
Raymond Occlusion, Class I			
Immediate Post-Procedure% (n/N)	37.6% (65/172)	41.1% (298/729)	0.457
One-Year Follow-Up % (n/N)	55.1% (43/78)	64.4% (250/388)	0.121
Recanalization at One-Year Follow-Up % (n/N)	12.8% (10/78)	14% (54/385)	0.205
Retreatment through One-Year Follow-Up	6.2% (5/81)	7% (28/399)	0.190
Device-Related SAE within 24 Hours of Procedure % (n/N)	1.7% (3/173)	3% (22/733)	0.360
Length of Hospital Stay, Median [IQR]	2 [1–14]	1 [1–10]	0.053

Conclusions Despite being associated with higher rates of rupture and wide-necked geometry, patients with posterior circulation aneurysms experienced immediate and one-year angiographic occlusion rates that were not significantly different from anterior circulation aneurysms. Device-related periprocedural complications were also not significantly higher than the latter.

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0-025 SOUND MEASUREMENT IN PATIENT-SPECIFIC 3D PRINTED BENCH MODELS FOR VENOUS PULSATILE TINNITUS

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Introduction Pulsatile tinnitus (PT) can be caused by aberrant blood flow in large cerebral veins near the cochlea. In our previous works we evaluated flow patterns in patient's