

Abstract P-027 Figure 1

(Single Layer Sphere with spherical configuration) were deployed in 18 elastase-induced aneurysms in the rabbits and followed for 12 months. Degrees of aneurysm occlusion immediately after treatment and before sacrifice were graded on a 4 point scale from digital subtraction angiography (DSA): Grade 1, complete flow cessation; Grade 2, near complete flow cessation; Grade 3, incomplete flow cessation; Grade 4, fully patent aneurysm. Comparison of aneurysm occlusion between acute and chronic time points was performed using a 3 point scale (stable occlusion, progressive occlusion, or recanalization). Two shapes of aneurysms were defined: Type I, spherical; Type II, cylinder-like. All aneurysms were harvested for histologic analysis.

**Results** Four spherical and 14 cylinder-like aneurysms were identified. Grade 3 or 4 occlusion was shown in all the three groups acutely. Before sacrifice, Grade 1 (n = 3) and Grade 2 (n = 3) were shown in DL group; Grade 1 (n = 1), Grade 2 (n = 2) and Grade 3 (n = 3) were indicated in SL group; Grade 1 (n = 1), Grade 2 (n = 1), Grade 3 (n = 3), and Grade 4 (n = 1) were shown in SLS group, respectively. Sixteen (89%, 16/18) aneurysms showed progressive occlusion. Aneurysm recanalization was found in one (6%, 1/18) aneurysm of the SLS group. One (6%, 1/18) aneurysm remained stable in SLS group. Extent of occlusion was greater in one spherical aneurysm treated with SLS device by comparison with other spherical aneurysms treated with DL or SL device. Histologic features included unorganized blood clot or organized loose connective tissue filling the aneurysm sac and endothelialized neointima or incompletely organized thrombus across the neck interface. Inflammation within aneurysm lumen was absent or minimal (as localized, patchy, chronic inflammatory foci) (See attached Figure 1).

**Conclusion** Progressive aneurysm occlusion can be achieved using all the three types of devices. Based on the good

healing achieved using SLS for spherical aneurysm, SLS may be helpful to occlude narrow neck (spherical) aneurysms.

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**P-028 SAFETY AND EFFICACY OF WEB® ANEURYSM TREATMENT: COMBINED ANALYSIS OF WEBCAST, FRENCH OBSERVATORY, AND WEBCAST2 STUDIES – PRELIMINARY RESULTS**

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**Purpose** WEB Flow disruption is an innovative endovascular treatment for wide-neck bifurcation aneurysms. Three prospective multicenter GCP (Good Clinical Practice) studies were conducted in Europe (WEBCAST, French Observatory, WEBCAST2). Safety and efficacy data are analyzed in the cumulated population of these 3 studies.

**Methods** Patients with wide neck bifurcation aneurysms were included in these 3 studies. An independent medical monitor independently analyzed adverse events. Follow-up imaging was obtained at 6 and 12 months in WEBCAST study and at 12 months in French Observatory. An independent expert in Interventional Neuroradiology evaluated anatomical results using the 3 grades scale: complete occlusion, neck remnant, and aneurysm remnant. In WEBCAST, the reader was also directly comparing evolution of anatomical results between 6 months and 12 months classified as improved, stable, or worsened.

**Results** A total of 168 patients (112 females, 66.7%) with 169 aneurysms including 14 ruptured (8.3%) were included in the 3 studies (51 patients in WEBCAST, 62 in French

Observatory, and 55 in WEBCAST2). Eighty-six out 169 aneurysms were located at middle cerebral artery (50.9%), 36/169 at anterior communicating artery (21.3%), 30/169 at basilar artery (17.8%), and 17/169 at internal carotid artery terminus (10.1%). Placement of the WEB device was feasible in 163/169 aneurysms (96.4%). Morbidity and mortality at one month were reported in 4/168 patients (2.4%) and 0/168 patients (0.0%), respectively. At 6 months, morbidity and mortality were reported in 1/99 patients (1.0%) and 3/99 patients (3.0%), respectively (there was no follow-up at 6 months in French Observatory).

Anatomical results at 6 months (WEBCAST and WEBCAST2) were complete aneurysm occlusion in 51/90 aneurysms (56.6%), neck remnant in 23/90 aneurysms (25.5%), and aneurysm remnant in 16/90 aneurysms (16.7%). Anatomical results at 12 months (WEBCAST and French Observatory) were complete aneurysm occlusion in 56/100 aneurysms (56.0%), neck remnant in 26/100 aneurysms (26.0%), and aneurysm remnant in 18/100 aneurysms (18.0%).

**Conclusion** This analysis in the large cumulated population of 3 GCP studies confirms the high safety of WEB treatment with low morbidity and mortality at one month and 6 months. At 6 and 12 months, adequate occlusion (complete aneurysm occlusion and neck remnant) was obtained in a high percentage of aneurysms (82.2% and 82.0%, respectively).

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**P-029 TURBULENT FLOW IN THE VENOUS OUTFLOW TRACT OF PULSATILE TINNITUS PATIENTS WITH SIGMOID SINUS DIVERTICULUM**

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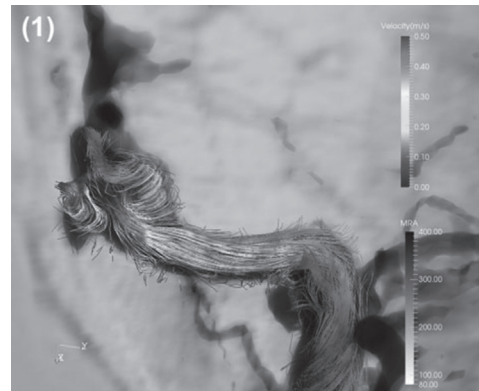
**Introduction/purpose** Pulsatile tinnitus (PT) has been linked to multiple anatomical variants of the venous outflow tract including sigmoid sinus diverticulum (SSD). We hypothesize that turbulence generated by the SSD, which is normally preceded by a transverse sinus stenosis (TSS), can explain the source of sound. Turbulent flow has a known association to vasculogenic bruit. Advanced magnetic resonance velocimetry (MRV) was performed in cerebral venous sinuses and internal jugular veins (IJV) to obtain both volumetric velocity and turbulence maps.

**Materials and methods** A series of MRI protocols was performed at 3 T for patients with suspected venous PT including contrast-enhanced MRA (CE-MRA) to delineate the anatomy and identify SSD, 4 D-flow MR to acquire time-resolved phase (velocity) and flow-encoded magnitudes in all three directions, as well as 2 D flow to obtain flow waveforms. Flow turbulence was quantified based on turbulence kinetic energy (TKE). Five SSD patients were evaluated, four of which had an associated TSS upstream from the SSD.

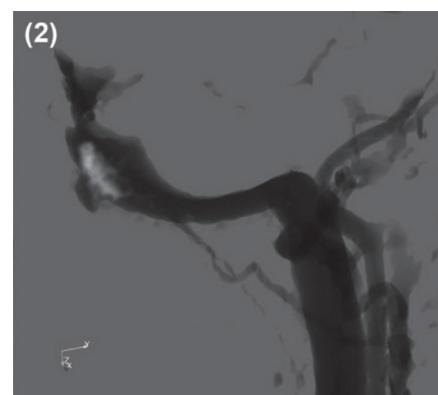
**Results** The TSS resulted in a jet of flow, the direction of which seemed to determine the position of the SSD downstream. The streamline visualization of the flow patterns revealed recirculation in the diverticulum. A helical flow pattern was also found adjacent to the jet flow opposite and downstream of the SSD (Figure 1). TKE mapping revealed a highly localized region of elevated TKE downstream from the

stenosis extending to the opening of the diverticulum with a maximum value of 80 J/m<sup>3</sup> (Figure 2).

**Discussion and Conclusion** The unique flow patterns and the presence of turbulence introduced by the TSS and SSD may help explain PT in these patients. Treatment of TSS with PTA and stent implantation, or treatment of the SSD with coil embolization can potentially alter the TKE level and pattern.



**Abstract P-029 Figure 1** A tilted anterior-posterior projection of the venous sinuses and IJV in a PT patient with the SSD and upstream TSS. MRV-based streamlines colored by the magnitude of the velocity are overlaid on to the geometry captured by CE-MRA (black)



**Abstract P-029 Figure 2** MRV-based measurement of the TKE in the same PT patient as shown in Figure 1. The elevated TKE region is highly localized to the downstream of the stenosis and extends into the opening of the diverticulum

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**P-030 PRELIMINARY EXPERIENCE WITH THE NEUROFORM ATLAS STENT IN STENT-ASSISTED ANEURYSM COILING**

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