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O-001 3D ANEURYSM WALL ENHANCEMENT IS ASSOCIATED WITH SYMPTOMATIC PRESENTATION

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Introduction/Purpose Aneurysm wall enhancement (AWE) is a potential surrogate biomarker for aneurysm instability. Previous studies have assessed AWE using 2D multiplanar methods, most of which were conducted qualitatively. A new quantitative tool to map 3D-AWE of brain aneurysms was studied on a large cohort of patients.

Materials and Methods Saccular aneurysms were imaged prospectively with 3T high resolution magnetic resonance imaging (HR-MRI). AWE patterns of symptomatic and asymptomatic aneurysms were analyzed with our 3D-AWE pipeline. Symptomatic aneurysms were defined as ruptured, presentation with sentinel headache, and presentation with cranial nerve neuropathy. Aneurysms were segmented and orthogonal probes were extended into the aneurysm wall to create 3D-AWE maps. (Figure 1). Three metrics were used to characterize enhancement: 3D circumferential AWE (3D-CAWE), aneurysm-specific contrast uptake (SAWE), and focal AWE (FAWE). Aneurysms with a circumferential AWE higher than the corpus callosum (3D-CAWE ≥ 1) were classified as 3D-CAWE+. Symptomatic presentation was predicted with univariate and multivariate logistic models. Aneurysm size, size ratio, aspect ratio, irregular morphology, and PHASES and ELAPSS scores were compared with the new AWE metrics. Compartmental bleb analysis and identification of microhemorrhages were also performed.

Results Ninety-three aneurysms were analyzed. Univariate analysis showed that 3D-CAWE, SAWE, and FAWE are predictors of symptomatic status (OR = 1.34, 1.25, and 1.08 respectively). A multivariate model including aneurysm size, 3D-CAWE+, age, female sex, and FAWE predicted symptomatic status with 80% specificity and 90% sensitivity (AUC = 0.914, NPV = 0.967). FAWE was also associated with irregular morphology and high-risk location (p = 0.043, p = 0.001 respectively). In general, blebs enhanced 56% more than the aneurysm body. Areas of microhemorrhage colocalized with increased SAWE (p = 0.047).

Conclusions Analysis of enhancement with 3D-AWE maps provides a new set of metrics that could potentially improve the identification of symptomatic aneurysms.


O-002 INCIDENCE AND PREDICTORS OF WOVEN ENDOBRIDGE (WEB) COMPACTION FOLLOWING TREATMENT OF INTRACRANIAL ANEURYSMS IN A LARGE MULTICENTER STUDY

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Introduction In recent years, there was a rising concern for increased rate aneurysm recanalization and retreatment following Woven EndoBridge (WEB) embolization due to device compaction. This phenomenon corresponds to a decrease in WEB height leading to aneurysmal recanalization. A better understanding of WEB compaction and its predisposing factors can potentially lead to higher aneurysm occlusion rates.

Objectives We aim to investigate the compaction rate of implanted WEB devices and the factors associated with this phenomenon.

Methods A retrospective analysis of the WorldwideWEB Consortium, a synthesis of prospectively maintained databases at 22 academic institutions in North America, South America, and Europe, was performed to identify patients with intracranial aneurysms treated with WEB device. Only adult patients (age >18 years) patients with available aneurysm measurements, imaging follow-up, and compaction rate were included in this study. Both ruptured and unruptured aneurysms in all locations were included. Device compaction was classified into no compaction, minor compaction (<50%), and major compaction (>50%).

Results A total of 405 patients (mean age 60 years; male: female ratio 1:2.8) met the inclusion criteria for this study. A ruptured aneurysm was present in 22.7% of patients. In the present study, minor compaction (<50%) and major compaction (>50%) were encountered in 31.4% and 10.1% of aneurysms, respectively. The degree of compaction correlated inversely with the rate of adequate aneurysm occlusion at last available follow-up as follows: 90.3% of aneurysms with no device compaction had adequate occlusion, compared to 78.9% in those with minor compaction and 70.7% with major compaction (p < 0.001). A direct correlation was found between device compaction and aneurysm retreatment rate, as 5.1% retreatment rate with no compaction, 13.7% with minor compaction, and 26.8% with major compaction (p < 0.001). On multivariable analysis, incomplete immediate aneurysm occlusion (p = 0.02) and a difference between aneurysm maximum width minus WEB width of >0.0 mm (p = 0.04, figure 1) were independent predictors of major compaction at last follow-up.

Conclusion WEB device compaction inversely correlates with aneurysm occlusion rate and directly with recanalization and retreatment. Using a device that is equal in width or oversized by 1–2 mm in relation to the aneurysm maximum width led to a significantly lower rate of major compaction. Immediate