Smokers Have Significantly Increased Rates of Intraoperative Microembolization Detected on Transcranial Doppler with Carotid Angioplasty/Stenting Compared to Endarterectomy Procedure in Preliminary Study

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Background: The benefits of revascularization must be balanced against the risks of peri/post-operative cerebrovascular events in determining the management of carotid stenosis. Higher rates of intra-operative microembolization during elective carotid revascularization are associated with increased risks of clinically detectable cerebrovascular accidents, and the identification of specific patient demographics that predispose to vulnerable plaque formation can be useful in guiding intervention and decreasing embolic potential during procedures.

Methods: 150 patients (symptomatic, stenosis>50%; asymptomatic, stenosis>70%) undergoing either CAS or CEA will be enrolled. A pre-operative Mini-mental Status Exam, carotid MRI, and cerebral diffusion-weighted MRI are obtained one week prior to intervention. All MRI are performed with 3T MR system, carotid plaque are classified according to AHA criteria. Intraoperatively, transcranial Doppler is performed to monitor for microembolic signals (MES), detected as high-intensity unidirectional transient signals. Plaque specimen and filter debris are analyzed histologically for high-risk characteristics and correlated with MRI. A post-operative DW-MRI and MMSE are performed within 72 hours to examine for microinfarcts and changes in neurocognitive function. Demographic analysis for cardiovascular risk factors, current and former smokers, was performed retrospectively.

Results: Preliminary results with 33 patients demonstrate an average of 46 total MES generated during carotid angioplasty/stenting in 4 nonsmokers, compared to 19.9 total MES in 9 nonsmoking patients undergoing endarterectomy (p = 0.091). In the smoker population, an average of 63.4 total MES was generated in 13 patients undergoing CAS compared to 21 total MES in 7 patients undergoing CEA (p = 0.024). Procedural phases with the highest production of microemboli include dissection phase during CEA (35.5% of total MES) and filter placement in CAS (22.2% of total MES).

Conclusions: Preliminary results suggest significantly increased microembolic potential and risk of clinically detectable CVA with carotid angioplasty/stenting compared to endarterectomy in smokers.

J. Li: None. C. Pina: None. D. Alicea: None. C. Giannarelli: Research Grant; Significant; NIH-NHLBI K23HL111339. V. Mani: Consultant/Advisory Board; Modest; Tursiop Technologies. A. Vouyouka: None. P. Krishnan: Speakers Bureau; Modest; AstraZeneca, Daiichi-Sankyo Co., Ltd. Consultant/Advisory Board; Modest; Abbott Laboratories; Covidien. R. Tadros: None. J. Badimon: None. Z. Fayad: Consultant/Advisory Board; Modest; Cerenis Therapeutics. J. Wiley: Consultant/Advisory Board; Modest; Abbott Laboratories, AngioDynamics. P. Faries: Consultant/Advisory Board; Modest; Covidien, Medtronic, Inc, Merck & Co., Inc.