Abstract Submitted
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In Vitro MRV-based Hemodynamic Study of Complex Helical Flow in a Patient-specific Jugular Model SARAH KEFAYATI, GABRIEL ACEVEDO-BOLTON, HENRIK HARALDSSON, DAVID SALONER, University of California, San Francisco, Radiology & Biomedical Imaging — Neurointerventional Radiologists are frequently requested to evaluate the venous side of the intracranial circulation for a variety of conditions including: Chronic Cerebrospinal Venous Insufficiency thought to play a role in the development of multiple sclerosis; sigmoid sinus diverticulum which has been linked to the presence of pulsatile tinnitus; and jugular vein distension which is related to cardiac dysfunction. Most approaches to evaluating these conditions rely on structural assessment or two dimensional flow analyses. This study was designed to investigate the highly complex jugular flow conditions using magnetic resonance velocimetry (MRV). A jugular phantom was fabricated based on the geometry of the dominant jugular in a tinnitus patient. Volumetric three-component time-resolved velocity fields were obtained using 4D PC-MRI –with the protocol enabling turbulence acquisition– and the patient-specific pulsatile waveform. Flow was highly complex exhibiting regions of jet, high swirling strength, and strong helical pattern with the core originating from the focal point of the jugular bulb. Specifically, flow was analyzed for helicity and the level of turbulence kinetic energy elevated in the core of helix and distally, in the post-narrowing region.

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