reflected inverse correlation between thrombus-T2* relaxation time and red blood cell content (figures A to E).

Conclusion FSE T2 WI and quantitative T2* mapping MR can help in characterization of emboli in large vessel occlusion patients.

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E-161 A NOVEL ANGIOGRAPHIC METHOD TO MEASURE ARTERIAL BLOOD FLOW RATES USING CONTRAST REFLUX

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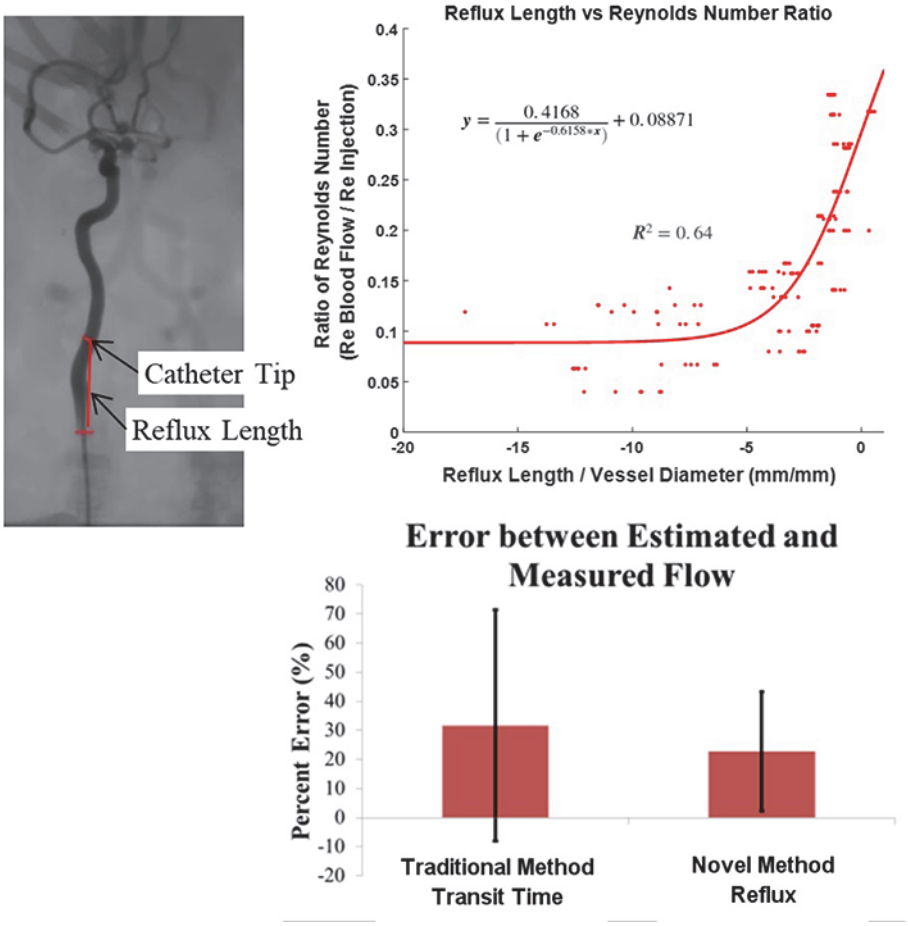
Introduction Several methods of extracting arterial blood flow rates from angiography have been attempted over the past decades.[1] [2] However, catheter-based contrast injections in arteries can cause substantial disturbances to the baseline blood flow,[3] which has limited the utilization of these methods in the clinical setting. Contrast reflux, which is the movement of contrast proximal to the catheter tip is frequently observed during antegrade angiography. The goal of this study was to evaluate the relationship between baseline hemodynamics and contrast reflux.

Methods A silicone replica of a complete circle of Willis was connected to a pulsatile flow pump (Vascular Simulations, Stony Brook, NY). Contrast injections (n=144) were performed in both the right carotid and right vertebral arteries under varying blood flow and injection conditions with high-speed (15 FPS) image acquisition. Reflux length was measured as the distance from the tip of the catheter to the most proximal point of contrast reflux. The reflux length was normalized by the vessel diameter at the catheter tip location and plotted against the ratio of the Reynolds number (a common fluid dynamics parameter) of blood flow to Reynolds number of contrast injection (figure 1). An appropriate equation was chosen to fit the data and the estimated mean blood flow from curve-fitting was compared to the true, measured blood flow. Mean blood flow was also estimated using the conventional Transit-Time method[1] and the flow estimation errors between the new and conventional methods were statistically compared.

Results The relationship between the Reynolds number ratio and reflux length could be described by a sigmoidal equation (figure 1, R^2=0.64). The Reflux method showed a lower error (22.8 ± 20.4%) as compared to the conventional Transit-Time method (31.7 ± 39.7%), but without statistical significance (p=0.27).

Conclusion The novel Reflux method presented in this study may have better accuracy and precision than conventional transit-time methods for estimating blood flow. Contrast reflux at the catheter tip is essentially an output of hemodynamic disturbances caused by catheter injections with baseline flow



Abstract E-161 Figure 1

and injection parameters as input. Thus, as opposed to traditional methods, the Reflux method inherently relies on, and is robust against, these hemodynamic disturbances. Refinement of the technique is needed to improve the accuracy and precision for clinical use.

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E-162 OPTIMAL PROJECTION ANGLE PLANNING TOOL FOR C-ARM IN AUGMENTED REALITY

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Introduction Acquiring images at an optimal projection viewing angle during a neurointerventional procedure is important to get proper view of aneurysms, avoid vessel foreshortening, obtain accurate measurements, and perform proper vessel cannulations. In some cases, the interventionalist may look for the appropriate view under fluoroscopy by acquiring multiple projection images. This radiation exposure can be avoided by using an interactive planning software that allows manipulation of a volumetric image. This abstract describes a novel method in which the interventionalist uses wearable augmented reality (AR) device to manipulate the volumetric image and select the view that best suits the procedure stage. The AR software generates the appropriate c-arm angle and indicates whether the angle is achievable by the c-arm.

Objective To provide the interventionalist a fast and intuitive way to manipulate volumetric images in order to select the best viewing angle while avoiding radiation exposure to scout for the best view.

Method An AR platform was developed to render volumetric data on wearable AR headset (Hololens2 Microsoft, Redmond WA). Hand gestures, eye gaze and voice control were provided as means to interact with 3D-rendered volumetric acquisition. A digitally reconstructed radiograph (DRR) in the direction of the physicians eyes was displayed in the headset next to the volumetric rendering. The corresponding C-arm angle was displayed above the DRR. Knowing the forward kinematics of the C-arm gantry (ceiling mounted Allura FD-20, Philips, NL), the color of the text changes based on whether the angle is achievable. A pre-op cone beam computed tomography (CBCT) image was acquired during a preclinical study. The interventionalist was presented with the volumetric rendering and asked to rotate the image to find the desired view. They were able to select the best viewing angle which was achievable by the gantry.

Results The interventionalist was able to achieve the desired angle without additional fluoroscopy and while remaining in the sterile field. The DRR provided a preview of what image to expect when the C-arm was moved to the calculated angle.

Conclusion Augmented reality provides a new interaction paradigm in the interventional suite. Articulated hand tracking proves to be an intuitive way to rotate and move the virtual content while remaining in the sterile field. Providing the C-arm angle to achieve the desired x-ray view has a potential to reduce radiation exposure during a procedure.

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E-163 A METHOD FOR AUTOMATIC ELOQUENCE EVALUATION IN ACUTE STROKE NEUROIMAGING

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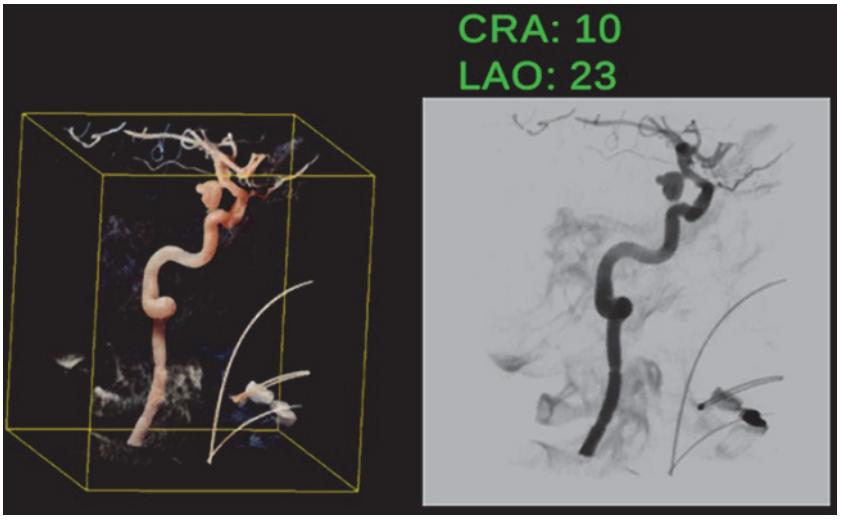
The current state of the art neuroimaging in patients with acute stroke presenting 6–24 hours after symptom onset includes CT or MRI perfusion sequences for delineating



Abstract E-162 Figure 1 Rendering captured from unity depicting volume rendered data on the left rotated to view the desired anatomy, and corresponding DRR on the right. The C-arm angles to achieve the DRR and displayed above the DRR