imaging protocol before EVT. An economic model based on current data was developed to assess the short and long term clinical and economic implications. The DTAS development scenario estimates a gradual 20% increase of DTAS rate for 4 years followed by a stable 80% rate of DTAS. Initial investment and additional organizational costs were included: 4M €. A cost-effective study compared the DTAS development scenario (SC1) to a scenario with no organizational changes (SC2) over 10 years.

Results The 10 year model included 1775 EVT patients in each scenario: SC1 68% DTAS Vs SC2 0% DTAS. SC1 would be associated with better functional independence rates (mRS 0–2: 45.8% versus 40.2% $p=0.04$) and a quality-adjusted life-years gain of 0.12 per patient. Despite the additional investment, SC1 development was associated with an estimated 15.1% reduction (26.25M €) of total costs (173.749M €). Cost saving was mainly due to long-term associated costs related with patient disability (€ 26.4 million).

Conclusions Our economic model predicts that the development of a DTAS program is cost effective.

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E-103 DESIGN AND EVALUATION OF AN XMR-VISIBLE CATHETER FOR STROKE APPLICATIONS

¹B Kilbride*, C Jordan, 94107¹, ²A Chu, ²D Barry, T Moore, 94107¹, A Martin, 94107¹, M Wilson, 94107¹, S Hetts, 94107¹. ¹Radiology and Biomedical Imaging, University of California San Francisco, San Francisco, CA; ²Penumbra Inc., Alameda, CA

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Introduction Acute ischemic stroke can be treated effectively under X-ray guidance, but eligibility for such treatment is limited by small time windows following symptom onset.

Treatment windows could be extended with MRI information since diffusion weighted imaging and perfusion imaging are the gold standard in determining if brain tissue is still salvageable by reperfusion therapy. Lack of safe tooling in such unique environments has limited catheter-based interventions as commercial devices use metallic reinforcement, introducing risk of RF-induced heating. We present a polymer-based catheter with a passive ink-based marker to create low-profile, MR-visible markers that can also be visualized under X-ray. Prototype feasibility was demonstrated *in vitro* and mechanically compared to a commercial guide catheter.

Methods Prototypes were built in a catheter fabrication facility (Penumbra, Inc., Alameda, CA). Polymer-based filament was wound onto an inner plastic liner. Four circumferential passive marker bands were painted 2 cm from the distal tip. Markers were an epoxy-based radiopaque ink (Creative Materials, Ayer, MA) doped with iron(III) oxide (Fe_2O_3) nanoparticles of 20–40 nm diameter (Alfa Aesar, Tewksbury, MA). The resulting subassembly was laminated with a multi-durometer thermoplastic jacket. MRI experiments were performed in a clinical hybrid interventional XMR suite. The catheter was submerged in water oriented parallel to B_0 on a 1.5T MRI scanner (Achieva, Philips, Best, The Netherlands). A gradient echo (GRE) and fast spin echo (TSE) were acquired. X-ray images were captured using a Cios Alpha portable C-arm (Siemens Healthineers, AG, Forchheim, Germany). Kink resistance was quantified with a benchtop fixture against a commercial guide catheter of similar dimensions.

Results The final device had outer and inner diameters of 2.36 mm and 1.83 mm, respectively, and a wall thickness of 0.265 mm. Negative contrast signal caused by the markers showed good tracking characteristics in the GRE and TSE sequences (figure 1). Radiopaque markers were visualized under X-ray in the water phantom. Prototype and commercial catheter distal kink radii were 7.5 mm and 11.0 mm, respectively. The prototype exhibited a larger wall thickness than the commercial device.

Conclusions MR and X-ray images demonstrated that the passive markers possessed good negative contrast signal at 1.5T

Abstract E-103 Figure 1 Visualization of prototype under X-ray and MR

and radiopacity in a water-filled phantom. Improved kink radii compared to a commercial catheter demonstrated a device that could maintain lumen patency during navigation. Device construction featured simple manufacturing steps to produce a low-profile catheter with MRI and X-ray visibility for neuro-interventional applications.

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E-104

IMAGE GUIDANCE FOR MECHANICAL THROMBECTOMY IN STROKE USING AN OPTICAL SEE-THROUGH HEAD-MOUNTED DISPLAY (OST-HMD): PROOF OF CONCEPT AND RATIONALE

¹G Deib*, ²T Song, ³W Gu, ³J Perkowski, ²N Navab, ²M Unberath, ⁴F Hui, ⁴P Gailloud.
¹Neuroradiology, West Virginia University, Morgantown, WV; ²Computer Aided Medical Procedures, Johns Hopkins University, Baltimore, MD; ³Cerenovus, Irvine, CA; ⁴Neuroradiology, Johns Hopkins University, Baltimore, MD

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Background and Purpose Optical see-through head-mounted displays (OST-HMD) can enable a mixed reality (MR) experience for neurointerventionalists during procedures encompassing high resolution radiographic imaging and an unhindered view of the procedural site. The authors present a technical note detailing an approach to mechanical thrombectomy in stroke utilizing an OST-HMD as an alternative to traditional angiography suite display monitors.

Methods Mixed reality visualization was achieved using the Microsoft HoloLens system. An anatomically realistic flow model was employed to perform the procedure. A commercially available guide sheath, intermediate aspiration catheter, microcatheter and mechanical thrombectomy device were utilized to perform a mechanical thrombectomy of a right M1 thrombus. The head mounted display created a real-time mixed reality environment by superimposing the virtual AP and lateral views onto the interventionalist's field of view. The procedure was filmed through the point of view of the operator. The video was reviewed to assess whether key anatomic landmarks and materials could be consistently and reliably visualized. Dosimetry and time of procedure were recorded. The operator completed a questionnaire following the

Abstract E-104 Figure 1

procedure detailing benefits, limitations, and visualization mode preferences.

Results A right M1 thrombectomy was successfully performed using OST-HMD image guidance on an anatomically realistic flow model. Dosimetry and procedural time compared favorably to typical procedural times. All visualization modes were equally effective in providing image guidance. Key anatomic landmarks and materials were consistently and reliably visualized.

Conclusions This preliminary study demonstrates that mechanical thrombectomy for stroke utilizing OST-HMDs for image guidance is feasible. This novel visualization approach may serve as a valuable tool for performing mechanical thrombectomy and other endovascular image-guided procedures.

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E-105

LEARNING CURVE FOR DIAGNOSTIC CEREBRAL ANGIOGRAPHY: TRANSRADIAL ACCESS VERSUS TRANSFEMORAL ACCESS

M Tso*, G Rajah, R Dossani, M Meyer, M McPheeters, K Vakharia, M Waqas, K Snyder, E Levy, A Siddiqui, J Davies. *Neurosurgery, University at Buffalo, Buffalo, NY*

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Background Diagnostic cerebral angiography (DSA) and neuro-interventions have traditionally been performed via transfemoral access (TFA). The perception of a steep learning curve associated with transradial access (TRA) has limited adoption in neurointervention. This study compares the learning curves of transradial vs. transfemoral DSA in a cohort of neurointerventional fellows.

Methods The first 150 consecutive radial and femoral DSA were identified for each fellow from a prospective neurointerventional registry from July 2017 to March 2020. Total fluoroscopy time and number of intracranial arteries injected were recorded. Mean fluoroscopy time per intracranial artery injected (termed angiographic efficiency) was calculated and was used as a surrogate measure of technical proficiency. Mean angiographic efficiencies were compared across partitions of 25 consecutive DSAs (e.g. 1–25, 26–50, 51–75, etc.).

Results There were 607 radial DSA and 635 femoral DSA identified among 5 fellows. The overall angiographic efficiencies were not significantly different based on access site (radial mean 3.2 min, femoral mean 3.7 min, $p > 0.05$). For 3 fellows without prior endovascular experience, technical proficiency was obtained between 25–50 femoral DSA procedures. Among these same fellows, one fellow achieved technical proficiency after 25–50 radial DSA procedures, while the other 2 fellows had flattened learning curves. There were 2 fellows that had no significant learning curve for either access type, but both had extensive experience with endovascular procedures prior to starting fellowship. Two patients (2/1342 = 0.1%) experienced transient neurologic symptoms post-procedure. Among 635 femoral DSA, there were 22 (3.5%) minor adverse events (14 small groin hematomas not requiring transfusion, 1 pseudoaneurysm, 7 non-flow-limiting dissections). Among 607 radial DSA, there were 3 (0.5%) minor adverse events (2 small forearm hematomas, 1 intraluminal wire removed with