was required to effect cure. In patients who suffered hemorrhages from floating teeth, bone formed and stabilized the teeth and no further hemorrhages occurred. Ethanol sclerotherapy proved curative in mandibular intraosseous AVMs in patients who had additional facial soft-tissue AVMs and intramaxillary AVMs that were cured as well at long-term follow-up.

Disclosures W. Yakes: None.

E-087 VIRTUAL ANGIOGRAPHIC RECONSTRUCTED PROJECTIONS FROM FOUR-DIMENSIONAL DIGITAL SUBTRACTION ANGIOGRAPHY ACQUISITION, A FEASIBILITY STUDY

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Introduction/purpose Digital subtraction angiography (DSA) remains the gold standard for the evaluation of extra- and intracranial vascular pathology. Typically, acquisition of multiple angiographic projections is needed to either elongate the vessel(s) of interest or to separate overlapping vessels. Acquiring multiple projections for each selected vessel is costly in terms of time, contrast load, and radiation exposure. Three dimensional digital subtraction angiography (3 DDSA) enabled angiographers to evaluate single vessel injections in multiple projections. Four dimensional digital subtraction angiography (4 DDSA) provides time-resolved 3D acquisition of both the arterial and venous phases of angiography. The aim of this paper is to evaluate the overall quality of processed 4 DDSA to discriminated vascular pathology from normal anatomy.

Materials/methods 3 D DSA acquisition was performed to capture primarily arterial phase (260 deg, 1.5 deg/f, rotation duration: ~6 s, 172 projections, 0.36 μGy/projection) or both arterial and venous phases (260 deg, 0.85 deg/f, rotation duration: ~12 s, 304 projections, 0.36 μGy/projection). Projection images obtained from the rotational acquisition were combined with the constraining 3D-DSA vascular volumes in order to form a time resolved 4 DDSA. Using an edge enhanced reconstruction kernel, the 4 DDSA volume was visualized with either a smooth or sharp image characteristic with a slice matrix of 512 × 512. This was then reconstructed into a Virtual Angiography image (Siemens). A secondary reconstruction of the mask phase of each DSA run was also performed to obtain soft tissue and bone anatomical information, from which standard biplane angiographic projections of the 4 DDSA were reconstructed. Windowing, contrast, brightness and opacity levels were adjusted.

Single frame images of processed 4 DDSA acquisitions were then evaluated by our Inerventional Neuroradiology staff, as were the corresponding standard biplane projections. Images were graded on overall quality (0 = nondiagnostic, 1 = poor, 2 = acceptable, 3 = good) and ability to discriminate pathology from normal vascular anatomy. Results were compared using standard multivariate two-sample t-test.

Results Four internal carotid artery and one vertebral artery injection were evaluated. All vessels had positive findings. Evaluators identified all positive findings on both 4 DDSA and standard DSA images. There was no significant difference in ability to clear the key branch points or vessels between standard and 4 DDSA (3.84 vs. 3.65, $p = 0.220$). The standard DSA image quality was significantly better than 4 DDSA (20.0 vs. 11.2, $p < 0.001$) in composite quality scoring.

Conclusions Pathology was clearly delineated from normal vascular anatomy on 4 DDSA. However, the quality of the processed 4 DDSA images remains inferior to standard DSA projections. 4 DDSA image quality may may be improved by optimizing acquisition parameters and injection rates, but this work illustrates significant limitations in the current post-processing algorithm as the source data demonstrates better quality and resolution prior to processing. As the acquisition and post-processing software improve, single injection 4 DDSA offers distinct advantages of decreased study time, contrast dose, and radiation exposure.

Disclosures L. Pung: 5; C; Siemens Medical Solutions. **R. Darflinger:** None. **J. Yu:** None. **M. Alexander:** None. **A. Nicholson:** None. **F. Settecase:** None. **T. Moore:** 5; C; Siemens Medical Solutions. **M. Amans:** None. **S. Hetts:** None. **D. Cooke:** None.

E-088 A FOLLOW-UP TO TRANSRADIAL ACCESS FOR ACUTE INTERVENTIONAL STROKE THERAPY – A FEASIBILITY STUDY

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Introduction Interventional stroke therapies are quickly becoming the new standard of care for acute large vessel occlusions. Stentrievers and aspiration catheters, while significantly improving recanalization rates, have increased the need for better catheter tracking and stable positioning within the neurovasculature. Difficulties in accessing the target vessel occlusion results in delays and a potential for poor outcome. The main intra-procedural cause for treatment delay and failure-to-treat includes unfavorable vascular anatomy. Type III or bovine aortic arch, extreme tortuosity, aortic aneurysms or severe peripheral vascular disease presents challenging obstacles in access. These anatomical abnormalities can make safe and timely transfemoral access difficult, even impossible at times. Alternative access modes, including transradial access, have proven effective in cardiovascular intervention and may provide advantages in circumventing tortuous vascular anatomy. This modality has been adapted for access in stroke intervention; herein, we present additional results from our previous experience with transradial access for endovascular stroke therapy.

Methods A retrospective review of our stroke database was conducted between January 2013 to February 2016 to identify all patients treated endovascularly through transradial access both as first or second intention. The primary outcome of this study measured the success of radial access in ischemic stroke therapy. Secondary outcome evaluated procedural time between cohorts where radial access was primary versus secondary, and procedural adverse events.

Results In total, 34 patients were identified, 17 were treated transradially as primary, 16 as secondary, and 1 was a tertiary attempt; the median age was 86 years [IQR 74–90].

In patients where radial access was first intentions, the median time from puncture to clot engagement was 69 minutes [IQR 28.5–78] (mean = 70.7 ± 52.4), with successful revascularization

achieved in 86.7% (13/15) of patients. Notably, one patient was approached via primary radial access, however resorted to a transfemoral approach; successful revascularization to mTICI 2 c was achieved.

As may be expected, in patients where radial access second intention, time to clot engagement was 91 minutes [IQR 51.5–125.5] (mean = 115.6 ± 53.8) from initial attempts; however, from secondary transradial attempts, median time was 44 minutes [14.0–77.0] (mean = 52.7 ± 46.3).

The median time difference between initial puncture to radial access rescue therapy was 14 minutes [IQR 2–46.5] (mean 35.7 ± 52.0). Success was achieved in 70.6% (12/17) of cases in this cohort. Overall, successful revascularization was achieved in 78.1% (25/32) of patients; mTICI scores were not available in 2 patients. There were 4 peri-procedural complications; however, none were considered related to radial access.

Conclusion While femoral access remains the standard operating procedure for endovascular intervention of acute ischemic stroke, in patients with tortuous vascular anatomy, or having severe femoral disease, access via transfemoral is discouraged. Results from our study demonstrate that radial access is a safe and promising alternative, both as primary and rescue attempts. In an effort to reduce overall procedural time, radial access should be considered for qualified patients. A larger sample size would better validate the present findings.

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E-089 IATROGENIC POST-OPERATIVE CAROTID ARTERY PSEUDOANEURYSMS, DIAGNOSIS AND ENDOVASCULAR MANAGEMENT

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Object Management of post-operative traumatic pseudoaneurysm of the external carotid and common carotid arteries has not been well characterized. Common presentation with early post-operative hemorrhages requires early diagnosis. We describe our experience with these lesions and review our diagnosis protocol, endovascular treatment and outcome.

Methods This is a retrospective review of patients treated between 2005–2014. Early post operative hemorrhages required immediate packing by ENT surgeon, hemodynamic stabilization and diagnostic workup, usually by CTA and DSA evaluation. We utilized an angiographic protocol to characterize the lesion, the vessel involved and the collateral circulation patency. We utilized combination of coils and nBCA glue embolization, to obliterate the lesion and the vessel segment along the external carotid distribution. Post embolization specific Super-selective injections were utilized to verify complete occlusion. Immediate and early clinical and angiographic results were reviewed.

Results We have treated 16 patients in this cohort. Thirteen lesions were associated with maxillofacial/oral surgeries and three were associated with tumor surgeries. Fifteen lesions were located in the ECA branches and one was located in the CCA. Fifteen patients presented with acute hemorrhage. We identified 13 pseudoaneurysms and three vessels interruptions.

There were no procedural ruptures or complications. All aneurysms were completely obliterated, with early unpacking by ENT surgeon and hemodynamic stability, without any early re-hemorrhages. No early or delayed signs of ischemia were noted.

Conclusions Carotid artery pseudoaneurysm, post maxillofacial/oral surgery can be treated early and effectively by endovascular procedures. High suspicion and early diagnosis associated with hemorrhages is crucial. Prompt imaging usually by CTA followed by selective cerebral angiography are highly effective. Utilization of coils and liquid embolic material can achieve immediate obliteration of the lesion and vessel segment. Selective post embolization studies of the collateral circulation are essential to confirm complete occlusion.

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E-090 FEASIBILITY OF A VASCULAR REPLICATOR FOR ENDOVASCULAR PROCEDURE REHEARSAL

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Background Multiple studies have shown the benefit of simulator use for medical trainees. In the endovascular realm, this has been demonstrated in the cardiac, vascular and neurovascular literature with both computer simulation models and physical models of the vasculature. In this study, the authors investigate the feasibility of a customized 3D model, not for training purposes, but for rehearsal prior to an actual endovascular treatment procedure.

Methods Thirty-five patients with intracerebral aneurysms in various locations were enrolled in the study. Cases were chosen based on attending surgeon preference. Rotational 3D imaging studies of the pertinent vascular distribution were used to manufacture a 3D vascular model of that patient's vascular tree. Then, prior to the actual procedure, the attending neurointerventionalist performed a practice procedure on the 3D flow model. The model was used in conjunction with a complete system containing a biphasic pump to simulate the cardiac cycle and blood flow (Vascular Simulations, Stony Brook, USA). This was a full procedure, done as the treatment procedure would be, using research materials, and a complete neuroangiography system. After the actual treatment procedure, comments were recorded from the neurointerventionalist regarding the potential benefit of the practice session.

Results Thirty-six procedures were done in thirty-five patients, 28 of the replicator sessions proved to be useful. Eight patients had replicator sessions that were not useful, and all of these were due to some failure of the replicated model. Models leaked in 4 cases, key vessels were not patent in the model in 4 cases, and 3 models had anatomic inaccuracies. When useful, the replicator sessions showed varying types of utility; allowing the operator to properly size a device, helping to choose the best wire and catheter combination to select a distal vessel, helping to understand the best landing zone for a stent, or simply allowing the operator to practice the procedure before the official treatment.