during embolization and thus may reduce procedural complications.

Material and Methods 3D AVM surface models were extracted from multimodal image data (3D digital subtraction image and MRA). For the virtual embolisation, all feeders of each AVM were identified and blocked separately. For n feeder arteries each blocked or unblocked, a total amount of n^2 blood flow simulations via computational fluid dynamics (CFD) was carried out. A custom visualization and exploration tool was developed using the Game Engine Unity where blood flow was illustrated via millions of small particles based on the CFD results.

Results The virtual embolisation software prototype allows the clinical expert to explore patient specific AVM models in 3D. Furthermore, the user can select and deselect feeder arteries to block (i.e. to embolize) or unblock them, respectively. Thus, the effects of an individual embolization strategy can be explored by analyzing the subsequent blood flow as well as by interpreting the resulting pressure gradients.

Abstract E-143 Figure 1 Depiction of the introduced AVM blood flow visualization. The user chooses a starting point of blood flow particles in the internal carotid artery and can follow the spread of particles along the feeder arteries to get an impression how the different feeders contribute to the blood supply of the nidus

Conclusion Because the success and safety of AVM treatment is a matter of hemodynamic balance until the draining veins are occluded by the embolization material, virtual AVM embolization is a powerful tool to simulate and explore the hemodynamic changes that occur at different embolization steps prior to AVM treatment.

Disclosures D. Behme: None. U. Sprengel: None. J. Stahl: None. P. Saalfeld: None. B. Behrendt: None. M. Thormann: None. A. Mpotsaris: None. B. Preim: None. P. Berg: None. S. Saalfeld: None.

E-144

THE PRESENCE OF CEREBRAL EDEMA IN ADDITION TO RETROGRADE LEPTOMENINGEAL VENOUS DRAINAGE IN CRANIAL DURAL ARTERIOVENOUS FISTULAS IS AN INDICATOR OF CLINICAL SEVERITY

I Nakagawa*, H Park, M Kotsugi, S Yokoyama, T Furuta, K Nakase, A Okamoto, S Yamada, H Nakase. *Neurosurgery, Nara Medical University, Kashihara, Japan*

10.1136/neurintsurg-2021-SNIS.239

Purpose Retrograde leptomeningeal venous drainage (RLVD) in dural arteriovenous fistulas (DAVFs) is associated with intracerebral hemorrhage and nonhemorrhagic neurological deficits or death. Although angiographic evidence of RLVD is a definite indication for treatment, the addition of venous congestion to RLVD may cause severe clinical symptoms. In this study, we assessed parenchymal cerebral blood volume (PBV) to evaluate whether the presence of cerebral edema in addition to RLVD predicts the clinical severity in DAVFs.

Methods We retrospectively identified 53 patients who had angiographic evidence of RLVD and received treatment. The presence of cerebral edema was defined as cortical hyperintensity in FLAIR image. The PBV was obtained from rotational angiography and analyzed by workstation (syngo XWP vD 10E).

Results In the cerebral edema group ($n=17$), cerebral microbleeds, venous congestion ratio, PBV ratio, and shunt circulation time (SCT) were significantly increased ($p<0.001$), and modified rankin scale > 2 at discharge was significantly higher ($p=0.014$). The preoperative PBV ratio was significantly correlated with the angiographic SCT and venous congestion ratios ($p<0.001$).

Conclusion Evaluation of PBV is useful for assessing focal venous congestion, and the presence of cerebral edema in addition to RLVD in DAVF can be an indicator of clinical severity.

Disclosures I. Nakagawa: None. H. Park: None. M. Kotsugi: None. S. Yokoyama: None. T. Furuta: None. K. Nakase: None. A. Okamoto: None. S. Yamada: None. H. Nakase: None.

E-145

SAFETY OF PEDIATRIC CEREBRAL ANGIOGRAPHY

¹D Lauzier*, ²J Osbun, ²A Chatterjee, ³C Moran, ²A Kansagra. ¹Mallinckrodt Institute of Radiology, Washington University School of Medicine, St. Louis, MO; ²Mallinckrodt Institute of Radiology, Department of Neurological Surgery, Department of Neurology, Washington University School of Medicine, St. Louis, MO; ³Mallinckrodt Institute of Radiology, Department of Neurological Surgery, Washington University School of Medicine, St. Louis, MO

10.1136/neurintsurg-2021-SNIS.240

Introduction/Purpose Catheter-based cerebral angiography is commonly used for neurovascular diagnosis in children. In this work, we aim to quantify the complication rate of cerebral angiography in children, characterize these complications, and identify risk factors for complications.

Materials and Methods Relevant clinical data were retrospectively obtained for 587 consecutive cerebral angiography procedures performed in 390 children from March 2002 to March 2020. Complications were categorized as neurologic or non-neurologic, and severity was graded using a standard schema. Incidences of complications are reported as point estimates. Associations between risk factors and complications were characterized in univariate analysis using the two-tailed

Fisher exact test and in multivariate analysis using multiple logistic regression with bidirectional elimination based on the Akaike information criterion. In both univariate and multivariate analyses, statistical significance was corrected for multiple comparisons using the Benjamini-Hochberg method with a prespecified false discovery rate of 0.05.

Results Complications occurred in 6.5% of procedures, including 1.9% neurological complications and 4.8% non-neurological complications. Permanent deficits occurred in only 0.2% of cases, corresponding to a single thromboembolic event. Overall, 0.5% of procedures resulted in major complications while 6.0% resulted in minor complications. Access site complications occurred in 0.7% of procedures and technical complications occurred in 0.3% of procedures. History of hypertension, history of ischemic stroke, and female sex were associated with an increased risk of complications, while femoral artery access was associated with a decreased risk of complications.

Conclusions Pediatric cerebral angiography has a low rate of major or permanent complications. Children with history of hypertension, history of ischemic stroke, or female sex are at higher risk of complications, while use of femoral access carries lower risk of complications.

Disclosures D. Lauzier: None. J. Osbun: 2; C; Medtronic, Microvention. A. Chatterjee: None. C. Moran: 2; C; Medtronic, Cerenovus. A. Kansagra: 2; C; Penumbra, Microvention, iSchemaView.

E-146

THE VALUE OF LONG-TERM ANGIOGRAPHIC FOLLOW-UP FOLLOWING PIPELINE EMBOLIZATION OF INTRACRANIAL ANEURYSMS

¹D Lauzier*, ¹S Cler, ²A Kansagra. ¹Mallinckrodt Institute of Radiology, Washington University School of Medicine, St. Louis, MO; ²Mallinckrodt Institute of Radiology, Department of Neurological Surgery, Department of Neurology, Washington University School of Medicine, St. Louis, MO

10.1136/neurintsurg-2021-SNIS.241

Introduction/Purpose Flow diversion of intracranial aneurysms with the Pipeline embolization device is commonly performed, but the value of long-term angiographic follow-up has not been rigorously evaluated. Here, we examine the prevalence of actionable findings of aneurysm recurrence and development of in-stent stenosis in a cohort of patients that underwent long-term angiographic follow-up at multiple timepoints. **Materials and Methods** Angiographic data from eligible patients was retrospectively assessed for aneurysm occlusion, in-stent stenosis, and aneurysm regrowth or recurrence. Aneurysm occlusion was determined using the O'Kelly-Marotta scale. Patients were included in this study if they underwent angiographic imaging at 6 months post-treatment and at least one later timepoint. Pertinent findings of aneurysm occlusion status and presence of in-stent stenosis at final follow-up were stratified based on findings on 6 month angiography.

Results 100% (132/132) of aneurysms occluded at 6 months remained occluded at final follow-up. Of those not occluded at 6 months, 85.7% (6/7) with an entry remnant, 56.3% (27/48) with subtotal filling, and 25% (6/24) with total filling at 6 months were completely occluded at final follow-up. 1.3% (2/149) of Pipeline embolization device constructs demonstrating no in-stent stenosis at 6 months developed in-stent stenosis on final angiography, while 44.4% (8/18) of PED constructs demonstrating in-stent stenosis at 6 months had

Abstract E-146 Figure 1 Preoperative angiogram showing a 9.1 mm saccular aneurysm at the petrous-cavernous junction of the left internal carotid artery (a), 6-month post-treatment angiography showing an entry remnant at the site of the treated aneurysm (b), 20-month post-treatment 3D rotation angiography showing a 3.4 mm saccular regrowth of the treated aneurysm (c), 3D rotation angiography after a second Pipeline embolization device treatment showing complete aneurysm occlusion (d).

resolution of stenosis on final angiography. No aneurysms that were completely occluded at 6 months recurred at later angiography, but one aneurysm enlarged from an entry remnant at 6 months to demonstrate subtotal filling at later follow-up (figure 1).

Conclusion Amongst patients that undergo treatment of intracranial aneurysms with Pipeline embolization device, the value of long-term angiography in patients demonstrating complete aneurysm occlusion and no in-stent stenosis on 6-month post-treatment angiography is low.

Disclosures D. Lauzier: None. S. Cler: None. A. Kansagra: 2; C; Penumbra, Microvention, iSchemaView.

Late-breaking oral abstracts

LB-001

FIRST IN-HUMAN TREATMENT OF COMMUNICATING HYDROCEPHALUS USING THE CEREVASC ESHUNT™ MINIATURE BIOMIMETIC ENDOVASCULAR CSF SHUNT

¹P Lylyk*, ¹I Lylyk, ¹C Bleise, ¹J Lundquist, ¹E Scrivano, ²B Beneduce, ³C Heilman, ³A Malek. ¹Instituto Medico ENER-Clinica La Sagrada Familia, Bs As, Argentina; ²Cerevasc Inc, Boston, MA; ³Neurosurgery, Tufts Medical Center, Boston, MA

10.1136/neurintsurg-2021-SNIS.242

Surgical ventriculoperitoneal shunting remains standard treatment for communicating hydrocephalus, despite significant infection and revision rates. A new minimally-invasive endovascular cerebrospinal fluid shunt has been developed (Cerevasc eShunt™) to mimic arachnoid granulation function. This implant is intended to be deployed via femoral transvenous approach across the inferior petrosal sinus dura mater into the cerebellopontine angle cistern. We hereby present the first