arteriovenous malformations (AVM) that underwent previous endovascular procedures.

Background Radiosurgery is an effective treatment for brain AVM, nonetheless delayed radiation-induced complications remain a significant problem, especially for late cerebral radiation necrosis, that usually occurs within 3 years after radiosurgical treatment. In the recent past, endovascular treatment by using liquid embolic materials has been extensively used to reduce the size of large AVM prior to Radiosurgery.

Methods From 2008 to 2018, 414 AVMs were treated with Gamma Knife in our hospital. 36 out of 414 AVMs underwent at least 2 endovascular treatments in adjunct to the radiosurgical treatment. A follow-up of at least 3 years was available for all these patients.

Results Five patients developed late symptomatic cerebral radionecrosis; in three patients, post-irradiative cystic formation with mass effect and signs of hemorrhage was found and two patients developed edematous solid mass lesions.

Conclusions A relevant percentage (5 out of 36 = 14%) of patients that received at least two endovascular plus radiosurgery treatments developed subsequent radiation necrosis

This series highlights the need for a defined strategy prior to initiation of treatment in brain AVMs and shows how repeated endovascular procedures in addition to radiosurgery can play a cumulative role in the development of late radionecrosis and cystic formations.

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Disclosure Nothing to disclose

EP27

VEIN OF GALEN ANEURYSMAL MALFORMATION (VGAM) – LITERATURE REVIEW OF THE OUTCOME DATA AFTER NEURO-INTERVENTIONAL TREATMENT

¹F Brassel, ¹M Schlunz-Hendann, ²M Scholz, ³F Brevis Nunez, ^{1,4}CM Sommer. ¹Radiology and Neuroradiology, ²Neurosurgery, ³Clinic of Pediatrics and Adolescent Medicine, Sana Clinics Duisburg, Duisburg; ⁴Clinic of Radiology, Heidelberg University Hospital, Heidelberg, Germany

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Introduction Vein of Galen Aneurysmal Malformation (VGAM) is a severe congenital intracranial vascular malformation that leads to high neonatal and infant mortality and neurological maldevelopment if not appropriately treated.

Objectives To review and compare the published outcome data after the neuro-interventional treatment of patients with VGAM.

Aims See under ‘Objectives’.

Methods Original studies on the neuro-interventional treatment of patients with VGAM published between 01/1980–01/2021 in PubMed were analyzed. The definition of inclusion (e.g., studies with >10 VGAM patients) and exclusion (e.g., studies including also entities other than VGAM e.g., dural arteriovenous fistula) criteria served to identify representative studies. The included studies were rated applying a semi-quantitative multi-dimensional rating system (e.g., considering the proportion of patients <1-month old or with complex VGAM angioarchitecture [e.g.,

choroidal type]) to better compare between the different studies.

Results Eight studies were included and underwent synthesis: study #1 (14 patients; 1988–1994), study #2 (317 patients; 1981–2002), study #3 (13 patients; 1994–2007), study #4 (26 patients; 1998–2012), study #5 (14 patients; 2001–2010), study #6 (18 patients; 2002–2018), study #7 (33 patients; 2003–2008), and study #8 (45 patients; 2004–2015). Applying the rating system, the best outcome data were observed for study #5 and #6 with 21/26 and 20/26 points, respectively. The worst outcome data were observed for study #1 with 6/24 points.

Conclusions The neuro-interventional treatment represents an essential pillar in the interdisciplinary management of patients with VGAM. The available studies are heterogeneous regarding terminology, patient demographics, the technique of embolization, and technical and clinical results.

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Disclosure Nothing to disclose

EP28

SURGICAL TREATMENT OF SPINAL AVM: 10 YEARS EXPERIENCE IN A SINGLE CENTRE

¹M Cenzato, ²D Boeris, ²E Marcati, ³M Piano, ²D Colistra, ³E Boccardi. ¹Ospedale Niguarda Milano; ²Neurosurgery; ³Neuroradiology, Ospedale Niguarda Milano, Milano, Italy

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Objective Surgical nuances, outcome, complications and of a single centre surgical series of SpinalAVMs (type II) treated at Niguarda Hospital (Milano, Italy) is presented.

Methods A single centre, retrospective case series review of patients that have been surgically treated in the last 10 years is hereby presented. Preoperative and postoperative MRI and angiograms have been reviewed. Patients have been assessed with the Aminoff & Logue scale.

Results 20 patients out of 53 patients harbouring a spinal vascular malformation (type I and II) have been surgically treated for true spinal cord AVMs (type II). 12 (60%) were intramedullary malformations and 8 (40%) were conus medullaris malformations. The most common presentation was progressive paresis/paralysis. The hemorrhagic presentation was reported in 2 patients. In 18 cases the AVM could be dissected from the surface until a complete excision of the nidus, In 2 other cases a trapping with an in-situ Laser coagulation of the nidus was performed.

The overall outcomes were 18 with Aminoff & Logue scale Motor score of 2 or less, 1 grade 5 and 1 dead due to extensive venous thrombosis and subsequent SAH.

Conclusions Pre-operative endovascular reduction, continuous neophysiological monitoring, intraoperative resection or trapping with Laser in-situ coagulation, and postoperative attention to the veins can lead to good surgical outcome also in these very eloquent AVMs. Due to the relative rarity of the pathology and in consideration of a poor natural history,

surgical resection of spinal AVM should be proposed in few referral centres.

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Disclosure Nothing to disclose

EP29

THE DIAGNOSTIC PERFORMANCE OF 4D-DSA PRODUCT AND PROTOTYPE SOFTWARE ON CEREBRAL AVM

L Pan, W Xiang, Y Zhao. *Neurosurgery Department, General Hospital of Central Theater Command, Wuhan, China*

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Introduction Accurate diagnosis is essentially important for treatment of cerebral arteriovenous malformation (AVM). Conventional digital subtraction angiography (DSA) are limited due to the complex vessel overlapping. 4D DSA with both temporal and spatial resolution is able to reveal AVM angioarchitecture.

Objective We compared the performance of 4D imaging with the conventional method for visualizing AVM.

Aim To evaluate the diagnostic performance of 4D DSA and 4D prototype.

Methods 37 patients were selected. The standard medical records were based on the conventional 2D and 3D DSA combination method. 2 independent experienced surgeons recorded assessments based only on 4D datasets. The evaluation results were then compared with the medical records using agreement analysis.

Results Using either 4D DSA or 4D prototype, both reviewers reached a complete agreement with the medical records for Martin-Spitzler Scores and the presence of intracranial aneurysm. Assessing the number of feeding arteries, the agreement between 4D DSA and the medical records was 0.888 for both Reviewer A and B; the agreement between 4D prototype and the medical records was 0.917 for both reviewers. Determining the number of draining veins, the agreement between 4D DSA and the medical records was 0.97 for both reviewers; the agreement between 4D prototype and the medical records was 0.943 for Reviewer A and 0.941 for Reviewer B.

Conclusion The diagnostic performance of both 4D DSA product and prototype software were largely equivalent to the combination method for cerebral AVM. 4D prototype further optimized the temporal resolution and image quality compared to 4D product.

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Disclosure Nothing to disclose

Miscellaneous

EP30*

THE NEGLECTED ARACHNOID TRABECULAE: AN IN-VIVO PRELIMINARY FEASIBILITY STUDY WITH USE OF TRANS-VASCULAR OCT IMAGING TO EXPLORE THE PERIVASCULAR SUBARACHNOID SPACE

V Anagnostakou, R King, G Ughi, A Puri, M Gounis. *Radiology, UMASS, 55 Lake Avenue North, Worcester, MA, USA*

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Introduction The micro-architectonics of the subarachnoid space consisting of multiple trabecular structures is not appreciated with traditional imaging methods. High-frequency optical coherence tomography (HF-OCT), is intra-vascular imaging with resolution of ~10µm. We describe the first pre-clinical observations with trans-vascular imaging of the subarachnoid space in a dog.

Material/Methods Five dogs were imaged using HF-OCT through the basilar, anterior spinal, middle and anterior cerebral arteries. We imaged the perivascular subarachnoid space at through vessels in the target area. Access was achieved through the vertebral artery to the P2-P3 segment with a microcatheter and through the internal carotid artery up to the M3-M4 segment for the MCA and A2-A3 segment for the ACA. The HF-OCT wire was delivered, unsheathed from the microcatheter and images were acquired with contrast injection at a flow rate of 4 ml/sec to clear the blood.

Results In all dogs, posterior circulation imaging was acquired while anterior circulation imaging was performed in three. Detailed images were obtained demonstrating perforating arteries and the surrounding environment. Multiple cobweb structures were depicted representing fine trabecular structures and arachnoid membranes of the subarachnoid space. Venous structures and nerve root origins were also recognized. In two animals, thickening of the vessel wall due to vasospasm from catheter manipulations did not allow for optimal images.

Conclusion HF-OCT imaging offers detailed visualization not only of the vessel wall, the branching pattern of cerebral perforators but also of structures of the subarachnoid space impossible to study with other imaging modalities due to inadequate resolution.

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