

## 1. Feasibility and validation of spinal cord vasculature imaging using high resolution ultrasound

Foad Abd-Allah<sup>1</sup>, Shahram Majidi<sup>2</sup>, Masaki Watanabe<sup>2</sup>, Saqib A Chaudhry<sup>2</sup>, Adnan I Qureshi<sup>2</sup>

<sup>1</sup>Neurology Department Cairo University Hosoiitals Cairo, Egypt, <sup>2</sup>Zeenat Qureshi Stroke Research Center, University of Minnesota Minneapolis, MN, USA

**BACKGROUND & PURPOSE:** Background:Ultrasound is non invasive method for visualization of arterial vasculature Purpose: We assessed the feasibility of imaging and characterizing blood flow in the anterior spinal artery using ultrasound with concurrent validation using a cadaveric model.

**METHODS:** We developed a protocol for ultrasonographic assessment of anterior spinal artery based on anatomic, morphologic, and physiologic characteristics of anterior spinal artery and determined the feasibility in 24 healthy volunteers using high frequency probe (3-9 MHz) through the left lateral paramedian approach in the area between T8 and T12. We ascertained the detection rate, depth of insonation, and flow parameters, including peak systolic velocity,end diastolic velocity, and resistivity indexes for both segmental arteries and anterior spinal artery . We validated the anatomical landmarks using simultaneous spinal angiography and simulated anterior spinal artery flow in a cadaveric set-up.

**RESULTS:** We detected flow in all segmental arteries at different levels of our field of insonation with mean depth ( $\pm$  standard deviation) of insonation at  $3.9 \pm 0.7$  cm identified by characteristic high resistance flow pattern. Anterior spinal artery was detected in 15 (62.5%) subjects at mean depth ( $\pm$  standard deviation) of  $6.4 \pm 1.2$  cm identified by characteristic low resistance bidirectional flow. Age, gender, and body mass index were not correlated with either the detection rate or depth of insonation for anterior spinal artery. Simultaneous spinal angiography and simulated anterior spinal artery flow in a cadaveric set-up confirmed the validity of our technique.

**CONCLUSIONS:** The current study describes a novel technique for noninvasive imaging of spinal vasculature using ultrasound which may enhance our diagnostic capabilities in emergent and intraoperative settings.

## 2. Not All “Successful” Angiographic Reperfusion Patients Are Equal: Validation of a modified TICI scoring system

Mohammed A Almekhlafi<sup>1,2</sup>, Sachin Mishra<sup>1</sup>, Jamsheed A Desai<sup>1</sup>, Vivek Nambiar<sup>1</sup>, Ondrej Volny<sup>1,6</sup>, Ankur Goel<sup>1</sup>, Muneer Eesa<sup>1,3</sup>, Andrew M Demchuk<sup>1,3,4</sup>, Bijoy K Menon<sup>1,3,4,5</sup>, Mayank Goyal<sup>1,3,4</sup>

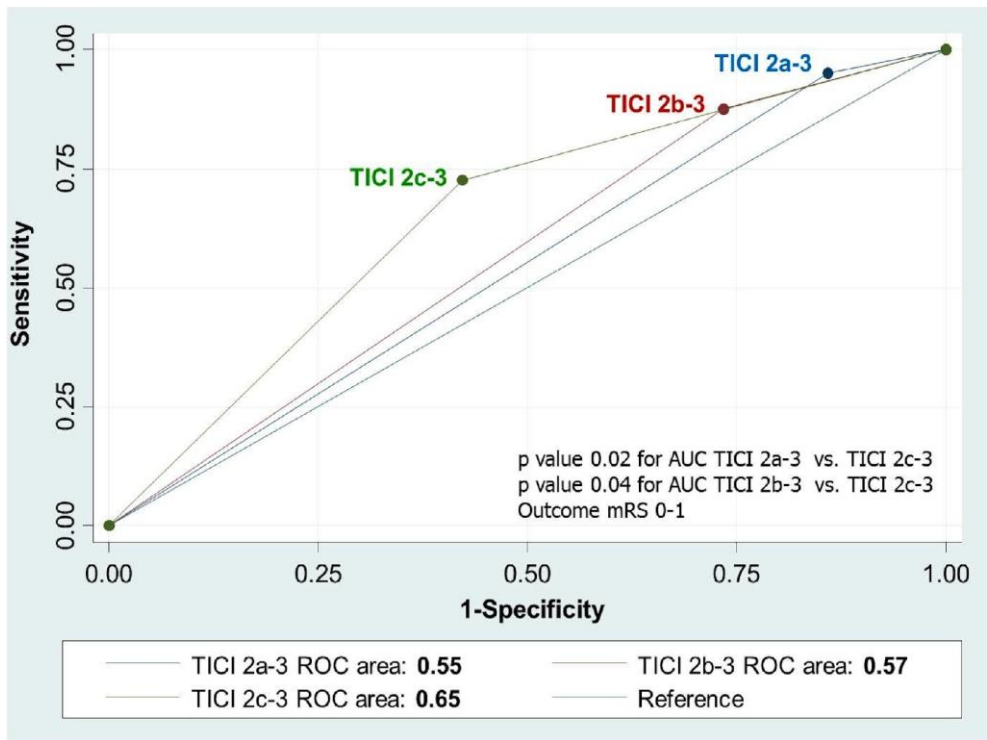
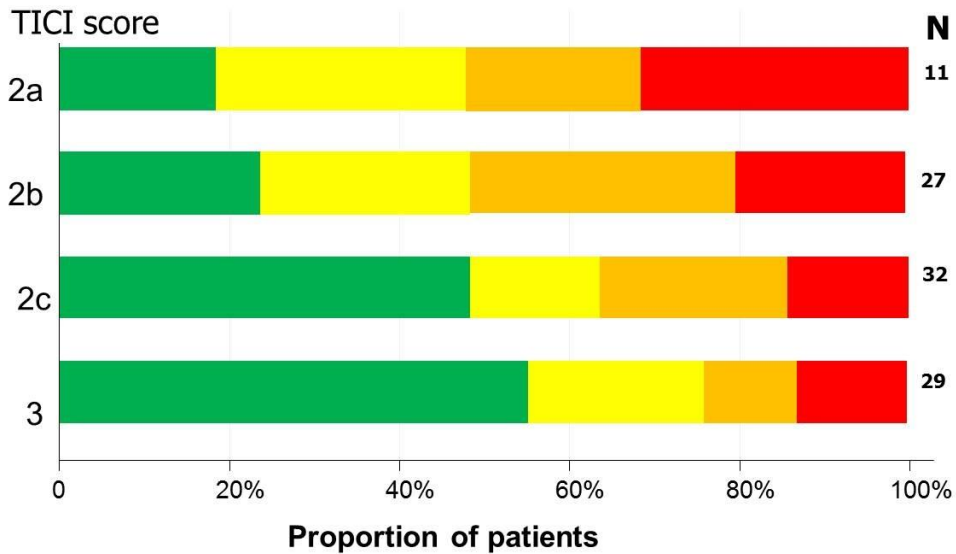
<sup>1</sup>Calgary Stroke Program, Department of Clinical Neurosciences, University of Calgary Calgary, AB, Canada, <sup>2</sup>Department of Internal Medicine, King Abdulaziz University Jeddah, Saudi Arabia, <sup>3</sup>Department of Radiology, University of Calgary Calgary, AB, Canada, <sup>4</sup>Hotchkiss Brain Institute Calgary, AB, Canada, <sup>5</sup>Department of Community Health Sciences, University of Calgary Calgary, AB, Canada, <sup>6</sup>1st Neurological Clinic & International Clinical Research Centre, Brno, Czech Republic

**BACKGROUND & PURPOSE:** Rapid reperfusion of the entire territory distal to vascular occlusions is the aim of stroke interventions. Recent studies defined successful reperfusion as establishing some perfusion with distal branch filling of <50% or more of territory visualized (TICI 2a). We investigate the importance of the quality of final reperfusion and whether a revision of successful reperfusion definition is warranted.

**METHODS:** This is a single-center prospective database of anterior circulation strokes treated using stentrievers. The quality of final reperfusion was assessed using two scores: the traditional TICI score and a modified TICI score that includes an additional category (TICI 2c) for near complete perfusion except for slow flow or distal emboli in a few distal cortical vessels. We compared different cut-off definitions of reperfusion (TICI 2a-3 vs. TICI-2b-3 vs. TICI 2c-3) using Area under the curve to identify their correlation with favourable 90-day outcome (mRS<2).

**RESULTS:** In our cohort of 110 patients, 90% achieved TICI 2a-3 reperfusion with 80% achieving TICI 2b-3 and 55.5% achieving TICI 2c-3. The proportion with favourable 90-day outcome was higher in the TICI 2c (46.9%) compared to TICI 2b (22.2%; p .04) but similar to the TICI 3 group (51.7%, p 0.7) [Figure 1]. A TICI 2c-3 definition of successful reperfusion had a better predictive value than TICI 2b-3 for 90-day mRS o-1 [Figure 2].

**CONCLUSIONS:** Defining successful reperfusion as TICI 2c-3 has merits. In this cohort, there was evidence toward faster recovery and better outcomes in patients with the TICI 2c vs. TICI 2b grades.



**3. WITHDRAWN**

**4. Unraveling the Brain Resting State in the Contexts of Gender, Education and Profession**

Rose Dawn Bharath<sup>1</sup>, Rajanikant Panda<sup>1</sup>, Rajakumari P. Reddy<sup>2</sup>, Neeraj Upadhy<sup>1</sup>, Lija George<sup>1</sup>, Thamodharan Arumugam<sup>1</sup>, Silpa Kanungo<sup>1</sup>, Shobini L. Rao<sup>2</sup>, Jamuna Rajeswaran<sup>2</sup>, Arun Kumar Gupta<sup>1</sup>

<sup>1</sup>Dept. of Neuroimaging & Interventional Radiology, National Institute of Mental Health and Neuro Science Bangalore, India, <sup>2</sup>Dept. of Clinical Psychology, National Institute of Mental Health and Neuro Science Bangalore, India

**BACKGROUND & PURPOSE:** Thirty years of brain imaging research has converged to define the brain's resting networks and proposed the clinical utility. The alterations in brain networks associated with ageing were studied previously but the underlying factors are still unclear. We aim to examine brain resting state networks in the context of gender, education and profession using functional magnetic resonance imaging (fMRI).

**METHODS:** Two hundred right handed college educated healthy volunteers from both genders with mean age of  $23.67 \pm 4.53$  years and mean education of  $17.58 \pm 4.8$  years were recruited. Subjects were grouped 50 males and 50 females, 50 engineers and 50 doctors and 50 mental health care and 50 non medical professionals. All were instructed to lie down with eye closed, awake and to be in relaxed-unfocused state. fMRI with EPI sequence (TR: 3000, 180 dynamics) and MPRAGE were acquired in a 3T MRI. Independent components were computed using MELODIC and group difference was computed using dual regression of FSL toolbox.

**RESULTS:** We noted that there was greater activation (higher intensity and voxel size) in sensory motor networks, executive networks and in DMN in males compared to females. Doctors had greater activation in sensory motor networks, parietotemporal lobe and lower in executive networks, DMN. Significant changes were also noted in resting state networks for mental health and non medical professionals.

**CONCLUSIONS:** Alteration of resting state network along with DMN suggested that cognitive functions could differ with respect to gender, education and profession. It is essential to consider these variables to minimize the variability in cognitive studies.

## **5. Case of Occipital Epilepsia Partialis Continua Presenting As Status Migrainosus: Clinical, EEG, and MRI Findings**

Weiwei Dai, Madeleine Grigg-Damberger

University of New Mexico School of Medicine, Department of Neurology Albuquerque, NM, USA

**BACKGROUND & PURPOSE:** Epilepsia partialis continua (EPC) and status epilepticus (SE) have been shown to cause transient MRI changes which often correlate with the epileptic focus.

**METHODS:** This is a case report of a 42-year-old woman with acquired left occipital simple and complex partial epilepsy following eclampsia in 2000. Her seizures were characterized by auras of flashing lights and scintillating scotomas lateralizing to her right visual field. In April 2013, she was admitted for a 2-week history of status migrainosus. She reported visual auras recurring every 5-10 minutes accompanied by near constant throbbing headache, nausea and repeated vomiting. Her seizures continued despite rapid escalation of outpatient antiepileptic medications.

**RESULTS:** Extended video-EEG findings performed upon admission demonstrated: 1) frequent local spike or sharp and slow wave discharges localized to the left occipital or left occipital/posterior temporal regions 2) recurring focal electrographic seizures emanating from the left occipital or left occipital-posterior temporal region and 3) patient reported visual auras consisting of flashing lights which correlated with prolonged episodes of focal left occipital electrographic seizures (Figure 1). MRI imaging of the brain demonstrated cortically based gyriform T2 FLAIR hyperintensity causing cortical thickening, with involvement of left parietal, temporal, and occipital lobes (Figure 2). Injection of contrast demonstrated subtle asymmetric enhancement of the overlying dura (Figure 2).

**CONCLUSIONS:** Occipital EPC can mimic status migrainosus. EPC can cause transient MRI findings which can help localize the epileptic focus. The medical literature on transient, often localizing, findings seen on brain MRI in EPC and SE will be reviewed.

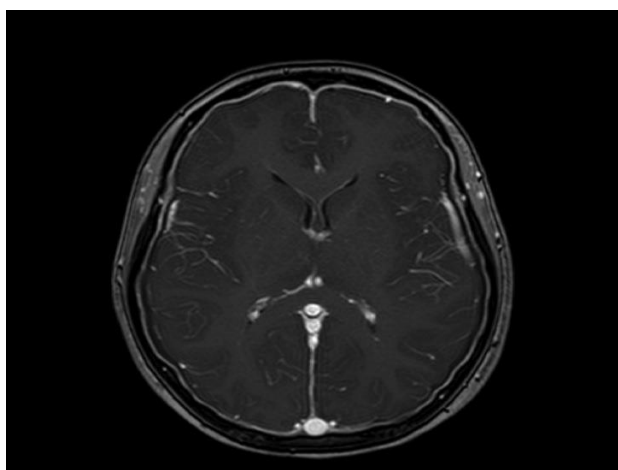
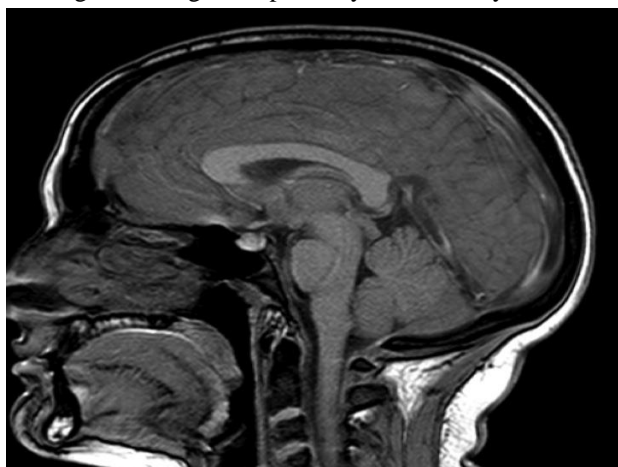


headaches. ICH is associated with low-cerebrospinal-fluid-(CSF) pressure, which causes decreased brain buoyancy and tension on the pain-sensitive structures within the cranium. We report the case of a post-partum woman with ICH, who was misdiagnosed with superior sagittal sinus thrombosis (SSST) because of a persistent-daily headache and hypodensity over the brain-convexity on CT-scan.

**METHODS:** An 18-year-old-woman presented with progressively-worsening daily headache, which was exacerbated by sitting-up and improved when lying-supine. The onset began after an uncomplicated vaginal-delivery one-week prior, in which she received epidural-anesthesia. The headache was accompanied by neck-pain and nausea. A CT-scan at an outside-hospital revealed a hypodensity within the central and bilateral high-convexity of the brain-parenchyma that was concerning for SSST. Therefore, she was transferred to our hospital for further-care. Patient had a normal neurological-exam.

**RESULTS:** Further work-up for a SSST with brain-MRI/MRV, revealed significant pachymeningeal enhancement, bilateral subdural-hyatomas, parafalcine subdural-hematoma, patent but engorged dural-sinuses, pituitary hyperemia and brain sagging. These MRI findings are consistent with ICH, which most likely occurred secondary to CSF-leak post-epidural anesthesia. The patient improved significantly with conservative management, which included strict bed-rest, aggressive oral/intravenous-hydration, high-dose caffeine and analgesics.

**CONCLUSIONS:** ICH can be spontaneous or secondary to any cause of dural-puncture. These patients frequently have normal neurological-examination, therefore advancements in MRI-imaging has augmented our ability to accurately diagnose ICH in those presenting with orthostatic-headache. Lumbar-puncture demonstrating low-opening-pressure is also supportive. Conservative treatment is very effective. However, in refractory cases lumbar-epidural-blood patch, epidural-fibrin-glue or surgical-repair may be necessary.



## 7. WITHDRAWN

## 8. Cerebral Amyloid Angiopathy: One Disease, Three Different Presentations

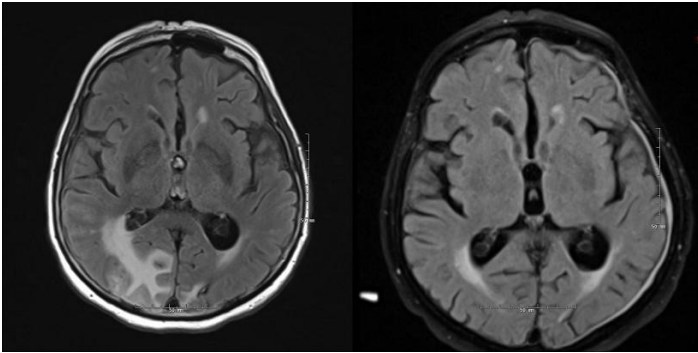
Pravin George, Ken Uchino

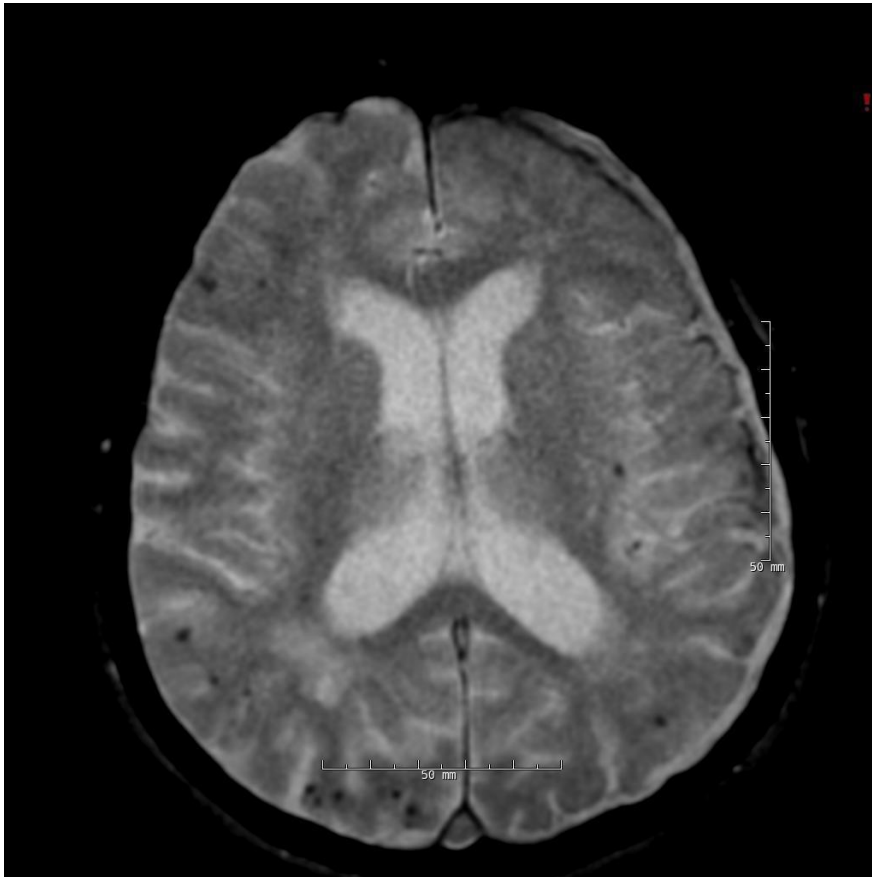
**BACKGROUND & PURPOSE:** Cerebral amyloid angiopathy (CAA) often manifests with intracerebral hemorrhage. Cerebral ischemia and leukoencephalopathy are other manifestations of CAA. We present the case of a patient affected by several manifestations of CAA in a one month period.

**METHODS:** Case Report

**RESULTS:** An 81-year-old female initially presented for evaluation of recurrent symptoms of left hand/arm and leg weakness followed by right hand numbness and mumbled speech. MRI was completed which showed bilateral infarct-like lesions suggestive of proximal embolic source or vasculitis. Initial embolic stroke workup was negative. About four weeks later, repeat MRI was completed for workup of recurrent numbness, aphasia, rapid cognitive decline and visual hallucinations. An acute/subacute right medial temporal 4x1.5cm hemorrhage with localized mass effect and innumerable punctuate foci of susceptibility artifact were noted throughout the cortical-medullary junctions. Bilateral occipital T2/FLAIR hyperintensities were also noted. Lumbar puncture was not suggestive of inflammatory disease, malignancy or infection. EEG was negative for seizures. Follow-up one year later showed reversal of the T2/FLAIR changes in the occipital lobes.

**CONCLUSIONS:** CAA has numerous presentations. It is generally characterized on MRI by numerous punctuate foci of susceptibility artifact and intracerebral hemorrhage. Ischemic lesions are common as well. Edema with associated encephalopathy and rapid cognitive decline is a rare complication of amyloid angiopathy related to inflammatory amyloid angiitis.





### **9. cervico-cephalic arterial dissection (CCAD) diagnosis and management: 8 year experience at Loyola University Medical Center**

Esteban E Golombievski, Miguel Situ, Sarkis Morales-Vidal, Michael Schneck  
LUMC Maywood, IL, USA

**BACKGROUND & PURPOSE:** Dissection of the carotid and vertebral arteries are known causes of ischemic stroke in otherwise healthy young and middle age adults. The term dissection applies to the separation of the different layers that constitute the arterial wall resulting in hemorrhagic or ischemic stroke among different clinical presentations. Neuroimaging plays a definitive role in diagnosis due to the wide array of symptoms than can present with an underlying CCAD.

**METHODS:** A retrospective chart review was conducted in order to identify how patients were diagnosed with CCAD (including findings on neuroimaging) and treated between 2006 and 2013.

**RESULTS:** A total of 98 patients were identified. CTA was the most common method used for diagnosis (73 out of 98 pts). The second image modality was MRA (42 pts) followed by conventional angiogram (25 pts) and ultrasound (3 pts). The most common feature suggestive for dissection was the 'string sign' demonstrated in CTA, MRA and Angiogram in descending order. Intimal flap was seen with CTA (11 pts) and MRA (1 pt). Regarding treatment the majority of patients were treated with antiplatelets/antiaggregants either alone or in combination with the remaining being treated with anticoagulants alone (26 pts).

**CONCLUSIONS:** CTA was the most commonly used tool for diagnosis likely due to its accessibility and high diagnostic yield. Ultrasound was less often used given its low specificity and sensitivity when comparing to other imaging modalities. Despite no clear consensus for treatment and no evidence supporting one type of treatment over the other there was a trend to use antiplatelets rather than anticoagulants.

### **10. Spontaneous Dissection of Bilateral Carotid and Vertebral Arteries with Successful Endovascular Treatment**

Nitin Goyal<sup>1</sup>, Shailesh Male<sup>1</sup>, Vinodh T Doss<sup>3</sup>, Lucas Elijevich<sup>1,2,3</sup>

<sup>1</sup>University of Tennessee Health Science Center, Department of Neurology Memphis, TN, USA, <sup>2</sup>University of Tennessee Health Science Center, Department of Neurosurgery Memphis, TN, USA, <sup>3</sup>Semmes-Murphey Neurologic and Spine

Institute Memphis, TN, USA

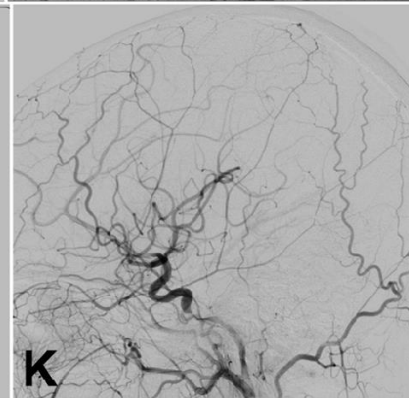
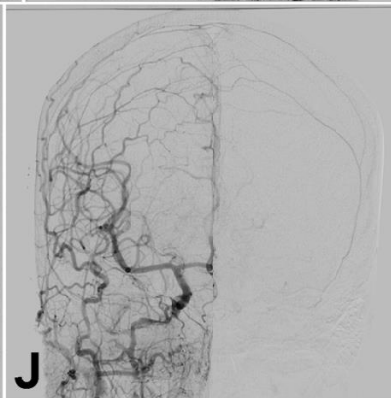
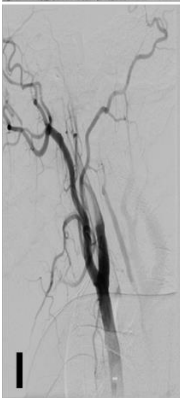
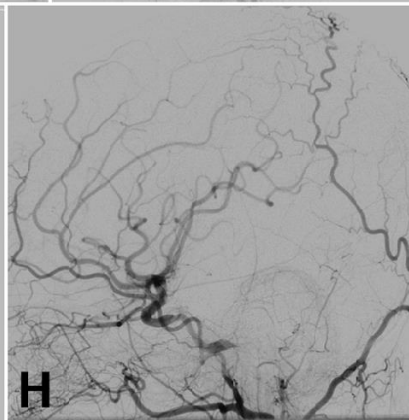
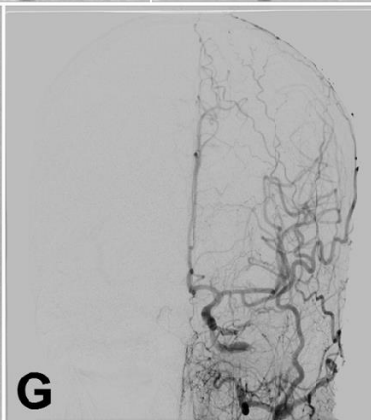
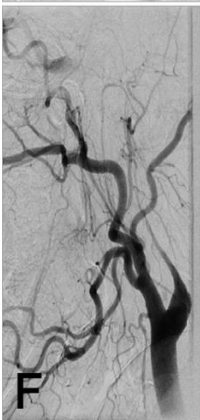
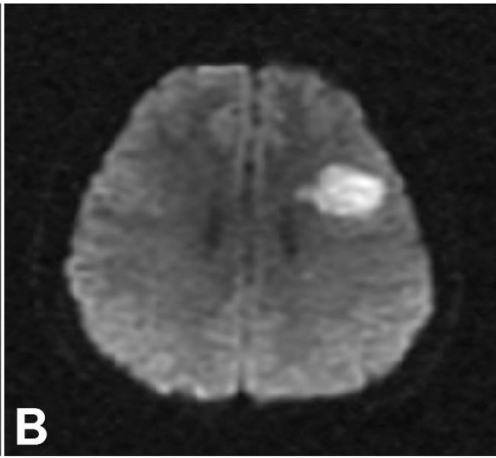
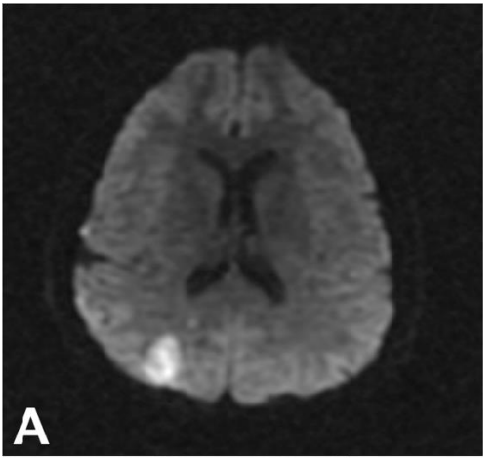
**BACKGROUND & PURPOSE:** Spontaneous non-traumatic dissection of cerebral vasculature is a common cause of stroke in the young. Usually dissection is limited to one or two cervical vessels. Non-traumatic four vessel dissection is rare and only handful of cases have been reported. We present a case of spontaneous dissection of all four cervical vessels and discuss the successful endovascular treatment.

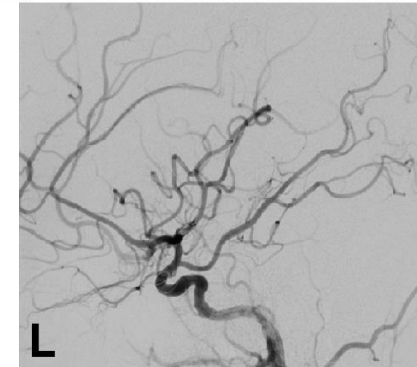
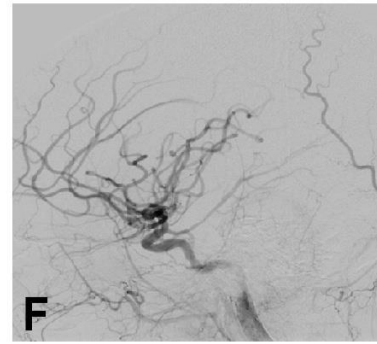
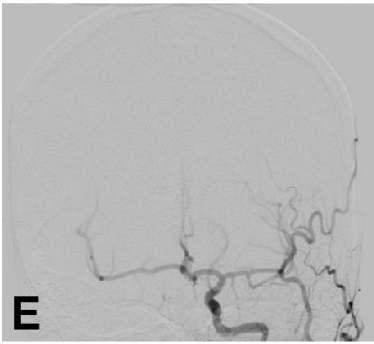
**METHODS:** Case Report: A 28 year old female, two weeks postpartum after spontaneous vaginal delivery presented with two weeks of headache. On admission she presented with acute right hemiparesis, gaze deviation and mixed aphasia - NIHSS 6. MRI of the brain revealed left fronto-parietal and right parieto-occipital acute strokes. CTA demonstrate bilateral internal carotid artery dissections. Digital subtraction angiography confirmed carotid occlusion and demonstrated non-flow limiting bilateral cervical vertebral artery dissection. (Figure 1.)

**RESULTS:** Endovascular Treatment and Follow-up: Stenting of the bilateral cervical ICA was performed with multiple overlapping carotid and coronary stents. (Figure 2) In our patient we decided to proceed with stenting and reconstruction of her carotids given the dependence of the patient's entire cerebral circulation on her vertebral arteries which were also injured. Progression of the vertebral dissections or embolization could have therefore been catastrophic. She made an excellent recovery and was discharged home. Follow-up NIHSS and MRS were both 0.

**CONCLUSIONS:** A high index of suspicion for cervical dissection is necessary in postpartum women with headache. Prompt identification and appropriate endovascular management can be life saving. Multi-vessel flow limiting dissections should be considered for endovascular treatment.







## 11. A rare case of giant AVM and pineal germinoma

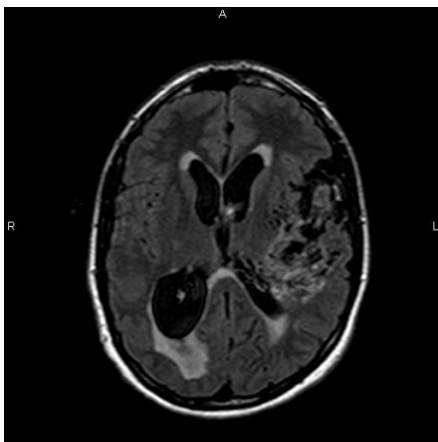
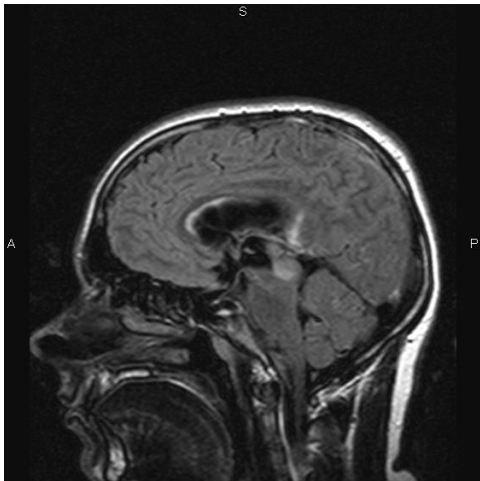
Ronak Jani, Thomas Pfiffner, Laszlo Metchler  
DENT Neurologic Institute Amherst, NY, USA

**BACKGROUND & PURPOSE:** A 17 year old male without any significant past medical history presented with persistent severe headaches associated with nausea and vomiting for about a week. MRI of brain with and without contrast was done for further evaluation which revealed an enhancing pineal mass causing obstructive hydrocephalus, and also a giant AVM in left frontal and temporal lobes. Endoscopic biopsy of the pineal mass and fenestration of the 3<sup>rd</sup> ventricle (Ventriculostomy) was performed. The diagnosis of pineal germinoma was made based on pathology. The patient underwent radiotherapy for the pineal germinoma. Chemotherapy was deferred due to the risk of bleeding from the giant AVM. Multiple embolizations (~10) and Stage III gamma knife surgery were performed for the giant AVM, which was complicated by a left frontal stroke, and right hemiparesis. No known cases of combined AVM and pineal germinoma have been reported in the literature. To our knowledge, we report a first case of combined giant AVM and germinoma.

**METHODS:**

**RESULTS:**

**CONCLUSIONS:**



## 12. Spectrum of Magnetic Resonance Imaging Findings in Sneddon's Syndrome

Seby John<sup>1</sup>, Shumei Man<sup>1</sup>, Rula Hajj-ali<sup>2</sup>, Ken Uchino<sup>1</sup>

<sup>1</sup>Cerebrovascular Center, Cleveland Clinic Cleveland, OH, USA, <sup>2</sup>Rheumatology, Cleveland Clinic Cleveland, OH, USA

**BACKGROUND & PURPOSE:** Sneddon's syndrome (SS), an uncommon cause of stroke in young is a non-inflammatory arteriopathy characterized by livedo reticularis and cerebrovascular disease. The spectrum of neuroimaging findings in SS is expanding. We describe our observations in patients with SS

**METHODS:** Three patients with SS at our institution were included. Images of MRI brain (with/without) contrast at initial presentation and subsequent follow-up were examined.

**RESULTS:** Case 1: (51 years, male) Initial MRI demonstrated multiple bi-hemispheric cortical punctate foci of restricted diffusion and symmetric T2/FLAIR hyperintensities extending along antero-posterior axis of the fronto-parieto-occipital lobe, suggestive of chronic ischemia. Repeat MRI after 18 months showed extension of the T2/FLAIR hyperintensities. Rituximab was started and imaging has remained stable a year later Case 2: (46 years, female) Initial MRI and follow-up over 36 months showed the development of silent infarcts, mostly cortical involving bilateral fronto-parietal lobes. Case 3: (31 years, female) Initial MRI showed multiple cortical and subcortical T2/FLAIR hyperintensities bilaterally. It also showed innumerable cortical microhemorrhages bilaterally. Over 24 months, there was development of multiple acute-subacute punctate areas of restricted diffusion, associated with contrast enhancement in addition to increasing microhemorrhages despite being on immunosuppression. Head and neck vessel imaging in all three cases was normal. Thorough evaluation for alternate etiologies in these patients was negative.

**CONCLUSIONS:** Neuroimaging in our patients with SS showed a spectrum of findings, including rare features of extensive cortical microhemorrhages with progression, and bi-hemispheric watershed infarcts. The pathological mechanisms responsible for these findings are unclear.

### 13. A Case of Bickerstaff's Encephalitis Treated with IVIG

Haris Kamal<sup>1</sup>, M Khaliq Ahmed<sup>1</sup>, Nicholas Silvestri<sup>1</sup>, Bijal K Mehta<sup>2</sup>

<sup>1</sup>SUNY Buffalo/ Department of Neurology Buffalo, NY, USA, <sup>2</sup>UCLA/Department of Neurology, Harbor-UCLA Medical Center Torrance, CA, USA

**BACKGROUND & PURPOSE:** A Case of Bickerstaff's Encephalitis treated with IVIG.

**METHODS:** 66 y/o female with a PMHx of GERD, hypothyroidism and rosacea presented with blurry vision that began 3 weeks prior to admission. She reported also developing dizziness, nausea, vomiting and diplopia around 4 days prior that had been persistent. She also noted a left facial droop and inability to close her left eye for the past 2 days. She appeared confused with a waxing and waning level of attention and concentration.

**RESULTS:** Cranial nerve exam showed her right eye deviated laterally with end kinetic nystagmus but the left eye did not cross the midline and the same finding for left lateral gaze. Her left eyelid showed ptosis. She was complaining of double vision in all directions of gaze. She also had a left sided facial weakness. The motor and sensory exam was normal but noted to be ataxic. MRI brain reported an area of hyperintensity along the anterior aspect of the fourth ventricle on FLAIR imaging. CSF was normal except for an elevated myelin basic protein level. She was initially started on IV Methylprednisolone which was later changed to a 5 days of IV Immunoglobulin. By day 5 of IVIG, her symptoms had resolved and the repeat MRI showed resolution of the lesion. Her GQ1-antibodies were positive consistent with a diagnosis of Bickerstaff's Encephalitis.

**CONCLUSIONS:** BBE is a variant of MFS. The efficacy of IVIG administration or plasma exchange in treatment of GBS is known, but there is no prior evidence in BBE. MRI after the treatment with IVIG showed significant resolution of demyelination and complete resolution of symptoms.

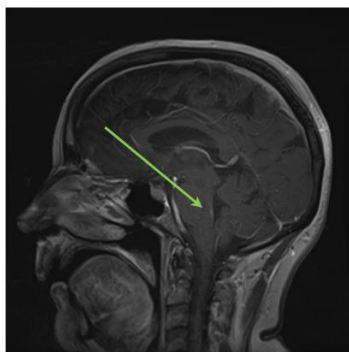


Figure 1. Sagittal T1  
with Contrast  
Additional Images  
Presented on Poster

#### 14. Baseline Diffusion Weighted Imaging Lesion Volume Predicts Disappearance of Infarct on Fluid Attenuated Inverse Recovery Sequences Within 30 Days of TIA/Minor Stroke

Mahesh P Kate, Parnian Riaz, Leka Sivakumar, Ashfaq Shuaib, Thomas Jeerakathil, Derek Emery, Kenneth Butcher  
University of Alberta Edmonton, AB, Canada

**BACKGROUND & PURPOSE:** Recent reports suggest that diffusion-weighted imaging(DWI) changes are not associated with evidence of infarction on Fluid Attenuated Inverse Recovery(FLAIR) sequences 90 days later in 30% of TIA/minor stroke patients. We completed a serial MRI study to determine the time course of infarct resolution. We tested the hypothesis that acute DWI lesion volume predicts infarct disappearance by 30 days.

**METHODS:** Acute TIA/minor stroke patients (NIHSS<3) were prospectively imaged at baseline, 7 and 30 days after symptom onset. Lesion volumes were measured planimetrically by a blinded rater at each time point on DWI and FLAIR sequences. Mean and relative(to contralateral tissue) Apparent Diffusion Co-efficient (rADC) values were also calculated.

**RESULTS:** Acute DWI lesions were found in 94/172 patients. DWI lesions at 7 days pseudo-normalized (infarct visible on FLAIR) in 3.4% and resolved without evidence of infarction in 8% of patients. Seventy-seven (82%) patients had persistent lesions on FLAIR at 30 days(FLAIR+). Baseline rADC was similar in FLAIR+ (0.84(0.17)) and FLAIR- patients (0.89(0.21), $P=0.155$ ). Baseline DWI volumes were larger in FLAIR+ (2.08 ml(6.9)) than FLAIR- patients (0.69 ml(0.95), $P=0.007$ ). ROC analysis indicated that a baseline DWI volume <2.04 ml predicted absence of FLAIR lesion at 30 days with a specificity of 100% and sensitivity of 50.6%.

**CONCLUSIONS:** Acute DWI lesions are transient and not always associated with visible infarction on FLAIR, even as early as 7 days after symptom onset. Delaying MRI results in a failure to demonstrate evidence of infarction in the majority of patients, particularly those with DWI lesion volumes below 2 ml.

#### 15. Uncommon radiological findings of CNS diseases in HIV patients

Sakshi Kaul<sup>1</sup>, Ajani Mason<sup>1</sup>, Mohan Kurukumbi<sup>2</sup>, Kamyar Sartip<sup>3</sup>, Annapurni Jayam-Trouth<sup>2</sup>

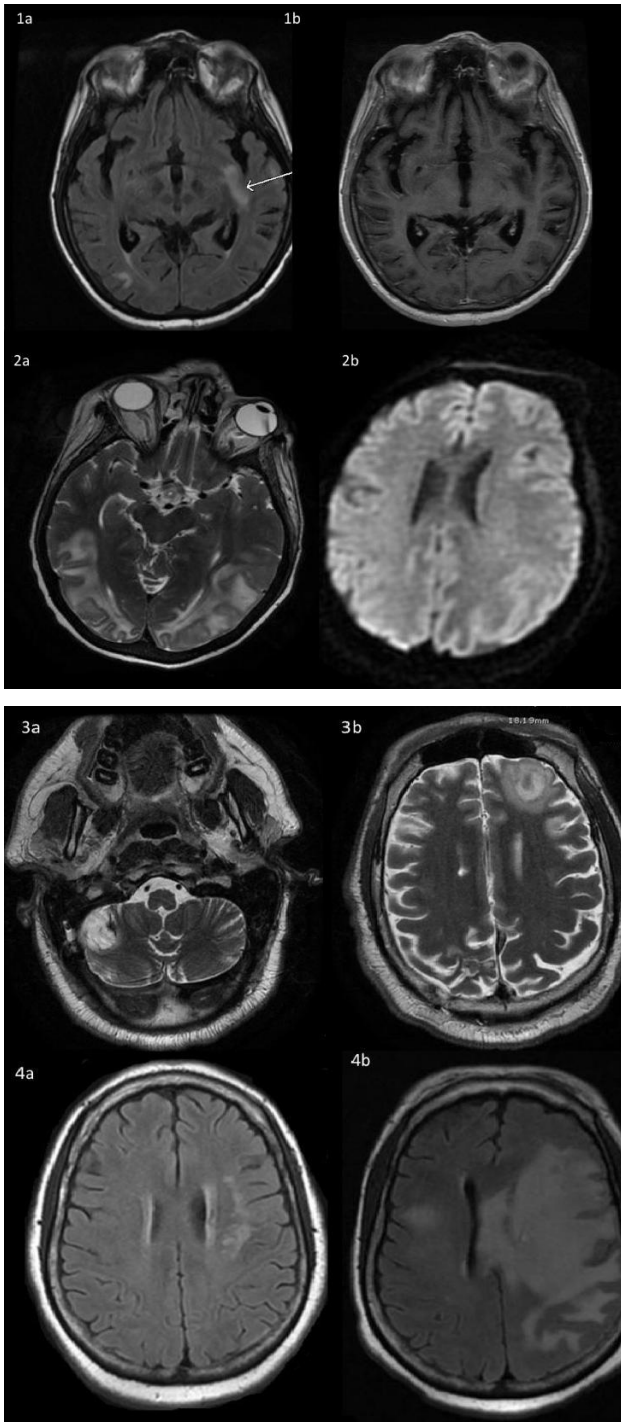
<sup>1</sup>Howard University College of Medicine Washington, DC, USA, <sup>2</sup>Department of Neurology, Howard University Hospital Washington, DC, USA, <sup>3</sup>Department of Radiology, Howard University Hospital Washington, DC, USA

**BACKGROUND & PURPOSE:** Opportunistic CNS lesions in HIV patients are a cause for morbidity and mortality. They may be identified by neuroimaging but also have the capacity to present atypically and can be diagnostically challenging.

**METHODS:** In this series, we present four uncommon radiological presentations of CNS disease in HIV patients.

**RESULTS:** Case 1 had CSF-confirmed cryptococcosis with atypical location, shape (Fig 1a), and non-enhancing features (Fig 1b). Case 2 had HIV-associated PRES (Fig 2a) with the characteristic normal DWI (Fig 2b), but without the common preceding etiology of hypertension. Case 3 had a previously untreated biopsy-confirmed posterior fossa CNS Lymphoma (Fig 3a) and new-onset treatment-responsive Toxoplasmosis (Fig 3b) in the same patient. Case 4 had CSF-confirmed PML (Fig 4a) and the development of IRIS following HAART initiation (Fig 4b).

**CONCLUSIONS:** Cryptococcosis may present without enhancement in a patient with significantly low CD4 levels. PRES may occur in HIV patients without hypertension. CNS Lymphoma can present concomitantly with Toxoplasmosis and the two may be difficult to distinguish. IRIS development in a severely immunocompromised HIV patient can stem from a previously overlooked PML. These findings call for increased radiological suspicion for early diagnosis of CNS disease in HIV patients.



### 16. Locked- in Syndrome Secondary to Post- Infectious Encephalomyelitis

Mohankumar Kurukumbi<sup>1</sup>, Suzanne Al- Hamad<sup>1</sup>, Kim Han<sup>2</sup>, Annapurni Jayam-Trouth<sup>1</sup>

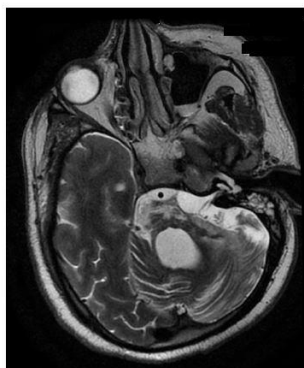
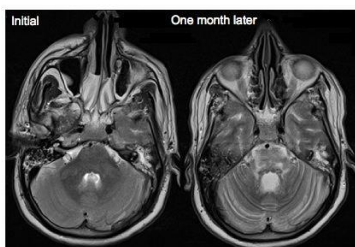
<sup>1</sup>Howard University Hospital Department of Neurology Washington, DC, USA, <sup>2</sup>Howard University Hospital Department of Radiology Washington, DC, USA

**BACKGROUND & PURPOSE:** Locked- in syndrome (LIS) is a clinical condition characterized by quadriplegia and anarthria with preserved consciousness and vertical eye movements. The etiologies of locked- in syndrome include infarction, hemorrhage, brainstem trauma, demyelinating disease, tumours and encephalitis. Here we present a unique case of a patient with post-infectious encephalomyelitis resulting in the rare outcome of LIS.

**METHODS:** The case is presented on a 35- year-old previously healthy male with post-infectious encephalomyelitis resulting in LIS.

**RESULTS:** The patient initially presented with headache and flu-like symptoms. He soon began to experience weakness that progressed to paraparesis followed by quadraparesis leading to respiratory failure and coma three weeks after initial presentation. Extensive investigation, including brain biopsy, did not reveal the etiological diagnosis however, based on the natural course of the disease post-infectious encephalitis was suspected. Initial MRI brain (Figure 1) revealed T2 hyperintensities in the pons, inferior midbrain and upper medulla. T2 signal abnormalities also involved the bilateral middle cerebellar peduncles and to a lesser extent the superior cerebellar peduncles. He had a poor response to IV Ig, steroid therapy and plasmaphoresis. Currently, seven months after the initial presentation, the patient's cognition has improved, however, he remains quadriplegic and in a locked-in state. His current MRI (Figure 2) shows marked atrophy and increased T2 hyperintensity of the pons, inferior midbrain and upper medulla. In addition, extensive worsening T2 signal abnormalities involve the bilateral middle cerebellar peduncles and superior cerebellar peduncles.

**CONCLUSIONS:** Post-infectious encephalomyelitis resulting in LIS is extremely rare. We are reporting this particular case to bring increased awareness to unique outcome of this disease.



## 17. WITHDRAWN

## 18. The difference of carotid duplex and neuroimaging between vertebral artery hypoplasia and vertebral artery stenosis/occlusion.

Ran Liu, Hai-ying Xing, Qing Peng, YU-hui Yin, Wei Sun  
department of neurology, peking university first hospital beijing, China

**BACKGROUND & PURPOSE:** to investigate the value of carotid duplex in the diagnosis of vertebral artery stenosis and hypoplasia.

**METHODS:** 88 patients were included whose carotid duplex ultrasonography showed vertebral artery velocity and/or

waveform abnormality on carotid duplex ultrasonography. 55 patients were diagnosed with vertebral artery stenosis or occlusion, 33 patients were diagnosed with vertebral artery hypoplasia by MRA, CTA or DSA. The diameter, peak systolic velocity (PSV), and resistance index(RI) of vertebral artery and the distribution of cerebral infarction were compared.

**RESULTS:** comparing with vertebral artery hypoplasia patients, the mean age( $66.82 \pm 9.76$  vs  $60.45 \pm 13.43$ ,  $P=0.01$ ) and vertebral artery diameter( $0.27 \pm 0.09$  vs  $0.23 \pm 0.07$ ,  $P=0.048$ ) were significantly greater than in vertebral artery stenosis/occlusion patients. The prevalence of high resistive waveform was higher in vertebral artery stenosis/occlusion patients than vertebral artery hypoplasia patients (50.9% vs 39.4%,  $P=0.049$ ). The PSV and distribution of cerebral infarction were not significantly different.

**CONCLUSIONS:** RI is a sensitive index in differentiating vertebral artery stenosis from hypoplasia, comparing with diameter and PSV.

## 19. Serial Power Doppler Neurosonography during Transarterial Embolization of Vein of Galen

Paul Maertens, Maude Crepault, Daniel Peterson, Steve Cordina

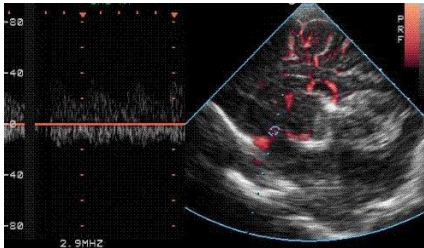
University of South Alabama/ department of Neurology Mobile, AL, USA

**BACKGROUND & PURPOSE:** It has been shown that power Doppler neurosonography (PDN) can identify feeding and drainage vessels of vein of Galen malformation (VGAM). No previous report of the serial use of PDN during embolization of VGAM is available in the literature.

**METHODS:** An infant with VGAM was followed prospectively from birth until 8 months of age with serial PDN. Conventional Doppler spectrometry was utilized to assess flow intensity and direction.

**RESULTS:** First PDN was at birth confirming diagnosis of VGAM. Feeding vessels were identified based on anatomy and flow spectrum (high time average mean velocities, high end diastolic velocities, low pulsatile and resistance indices). At age 4 months he underwent first transarterial embolization (TAEM) with coil placement in the right PCA feeder. The embolic material appears hyperechoic and produces shadowing. At age 7 months, TAEM of the left anterior choroidal artery feeder branch was complicated by migration of a piece of coil into the left cavernous sinus. This resulted in no impact on venous drainage. At age 8 months, TAEM of posterior and anterior choroidal artery and left SCA branches was successful in decreasing flow in the VGAM, and eventually led to clot formation in the VGAM (figure 1).

**CONCLUSIONS:** Serial PDN during TAEM allows visualization of embolic material, and non invasive evaluation of the status of the VGAM after each procedure.



## 20. Corpus Callosum lesion: stroke or glioblastoma?

Konark Malhotra, Ramnath Santosh Ramanathan, Zain Gudduru, Nawal Shaikh, Sandeep Rana

Neurology, Allegheny General Hospital, Drexel University College of Medicine, Allegheny Health Network Pittsburgh, PA, USA

**BACKGROUND & PURPOSE:** Corpus callosal infarcts are rare due to dual blood supply from anterior and posterior circulation. Branch from anterior communicating artery supplies rostrum and genu while splenium derives its vascular supply from a branch of posterior cerebral artery. Differential diagnosis of lesions in corpus callosum includes neoplasm, lymphoma, demyelinating conditions, contusion, and glioblastoma multiforme (GBM). GBM usually presents with heterogeneous enhancement and central necrosis giving the butterfly appearance.

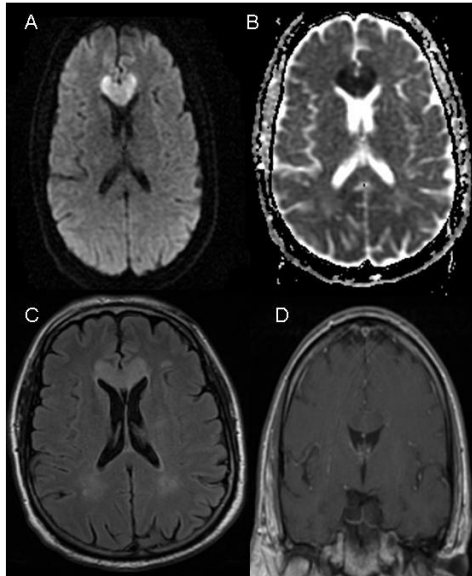
**METHODS:** We present a 58 year-old caucasian male with history of hypertension, obstructive sleep apnea and tobacco abuse presented with confusion, gait instability and reportedly being "slow" for 2 weeks. On initial neurological exam, patient was found to have left facial droop with no other neurological deficits.

**RESULTS:** Initial CT-head showed hypoattenuation within left frontal lobe and genu of corpus callosum. CT angiogram head and neck showed occlusion of left internal carotid artery and proximal right M1 segment with extensive narrowing of anterior cerebral arteries. MRI brain revealed an area of restricted diffusion in the rostrum, genu and body of corpus callosum. CT-chest/abdomen/pelvis showed no evidence of primary neoplasm. Biopsy of the brain lesion showed



accumulation of macrophages and reactive vascular changes with partial loss of axons consistent with subacute infarct.

**CONCLUSIONS:** Corpus callosum stroke is a diagnostic challenge due to confusing clinical and imaging presentation. Biopsy has been gold standard to diagnose corpus callosal lesions but can be avoided with detailed clinical and repeated imaging studies.



## 21. The Association between Hyperdense Middle Cerebral Artery Sign and the Location of Vessel Occlusion

Shumei Man, Shazam M. Hussain, Dolora Wisco, Esteban Cheng-ching, Ken Uchino  
Cerebrovascular Center/Neurological Institute, Cleveland Clinic Cleveland, OH, USA

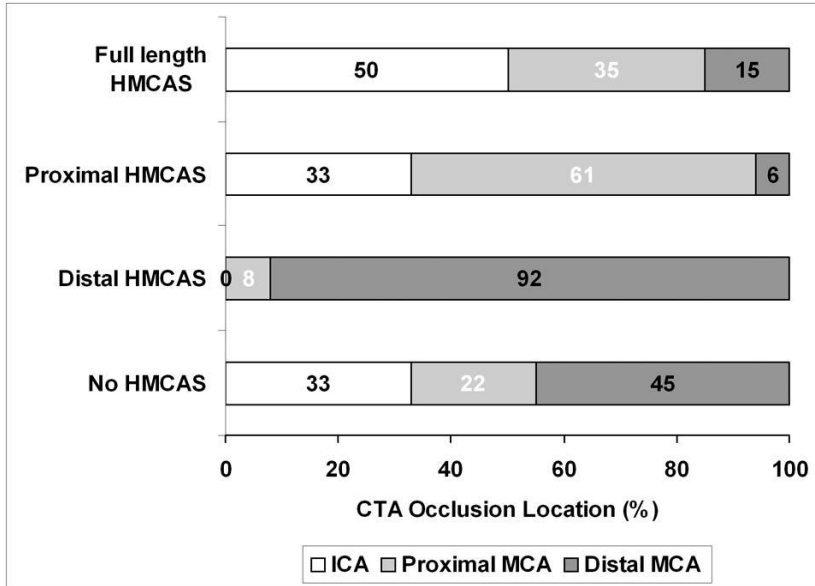
**BACKGROUND & PURPOSE:** Hyperdense middle cerebral artery sign (HMCAS) on nonenhanced CT (NECT) is a sign of thrombus in the middle cerebral artery. HMCAS has been studied to predict thrombolytic therapy outcome. However, its association with vessel occlusion location remains unclear. In community hospitals, CT angiography (CTA) is not readily available. We aimed to investigate whether the location of HMCAS on pre-treatment NECT indicates the location of vessel occlusion.

**METHODS:** Data were abstracted from our Hyperacute Ischemic Stroke database. Patients with occlusion in ICA, MCA or MCA M2 branches who underwent IA therapy were included. CTA was performed immediately after NECT. Based on the location of HMCAS on NECT, HMCAS was categorized into M1 HMCAS, hyperdense M2 and No HMCAS. M1 HMCAS was further grouped into: Proximal HMCAS, hyperdensity within the proximal half of M1 MCA Distal HMCAS, hyperdensity at the distal half of M1 and Full length HMCAS.

**RESULTS:** Among 126 patients with acute large vessel occlusion undergoing endovascular treatment, 64 (51%) had M1 HMCAS, 11 (9%) had hyperdense M2, and 51 (40%) had no HMCAS (No HMCAS group). The location of HMCAS represented a distinct pattern of vessel occlusion identified on CTA (Figure). ICA occlusion happened in 33% no HMCAS group, 50% full length HMCAS and 31.3% proximal HMCAS group. Hyperdense M2 reflected M2 occlusion.

**CONCLUSIONS:** For acute ischemic stroke due to anterior circulation large vessel occlusion, the lack of HMCAS on NECT harbors both ICA, proximal and distal MCA occlusion. Among those with hyperdense MCA sign, proximal HMCAS predicts proximal vessel occlusion.

Figure



## 22. The location of Vessel Occlusion Predicts the Outcome of Intra-arterial Thrombectomy for Acute Stroke

Shumei Man, Shazam M. Hussain, Dolora Wisco, Esteban Cheng-ching, Ken Uchino  
Cerebrovascular Center/Neurological Institute, Cleveland Clinic Cleveland, OH, USA

**BACKGROUND & PURPOSE:** Intra-arterial (IA) mechanical thrombectomy has an excellent recanalization rate but does not always correlate with good clinical outcomes. We aimed to investigate whether vessel occlusion location on pre-intervention CT angiogram can predict IA therapy outcome for acute stroke.

**METHODS:** Data were abstracted from our Hyperacute Ischemic Stroke database. Patients with occlusion in ICA, MCA M1 segment or M2 branches who underwent IA therapy were included. Based on the location of the vessel occlusion, patients were divided into four groups: ICA, Proximal M1, distal M1 and M2 MCA group. Favorable outcome was defined as modified Rankin score 0-2 at 30 days.

**RESULTS:** Among 126 patients, number of patients with occlusion at ICA, proximal M1, distal M1 and M2 was 34, 29, 54 and 9 respectively. There was no difference among groups in age, gender and time to tPA ( $p>0.05$ ). ICA and proximal M1 group had significantly higher initial NIHSS than M2 and distal group (median 19, 15, 13, and 13 respectively); lower initial CT ASPECT (median 8, 8, 9, and 9). After IA therapy, ICA and proximal M1 occlusion had larger stroke volume on DWI than M2 and distal M1 occlusion (median 168cc, 51cc, 9cc and 36cc), and fewer favorable outcome: 6(17.6%), 4(13.8%), 21(38.9%), and 3 (33/3%) respectively,  $p=0.005$  by Chi-square test comparing ICA and proximal M1 as a group vs distal M1 and M2 group.

**CONCLUSIONS:** For acute ischemic stroke, ICA and proximal M1 occlusion was associated with lower rates of favorable outcome after IA therapy.

## 23. The Bishop's Crook Sign: A New MRI and Neurosonography Pareidolia in Joubert Syndrome

Andrew T Manley, Paul M Maertens  
University of South Alabama Mobile, AL, USA

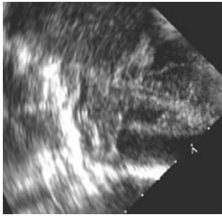
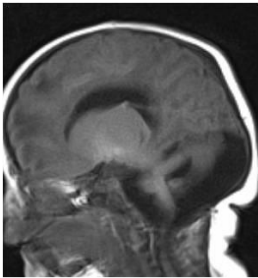
**BACKGROUND & PURPOSE:** By pareidolically recognizing specific patterns indicative of particular diseases, neuroimagers reinforce their mnemonic strategies and improve their neuroimaging diagnostic skills. Joubert syndrome (JS) is an autosomal recessive disorder characterized clinically by mental retardation, episodes of abnormal deep and rapid breathing, abnormal eye movements and ataxia. The pareidolical perceptions of a molar tooth and batwing have been used as neuroimaging signs characteristic of JS. The discovery of a new pareidolical sign may strengthen our diagnostic skills of JS.

**METHODS:** Retrospective case study. We evaluated a neonate who had a brother with JS with brain MRI and neurosonography.

**RESULTS:** Both cranial ultrasound and MRI of the brain showed the characteristic molar tooth sign. There was no

batwing sign. Instead there was a Bishop's crook in the parasagittal views of the posterior fossa where the shaft of the crook is the thickened superior cerebellar peduncle and the arc is made by the section of the cerebellar hemisphere. By ultrasound the Bishop's crook sign was seen through the posterior fontanelle only.

**CONCLUSIONS:** Neuroimaging diagnosis of JS, which already involves the pareidolical recognition of specific patterns indicative of the disease, can be improved by recognition of the Bishop's sign on MRI and ultrasound.



#### **24. Identifying spinal intradural arachnoid cysts on MR and CT imaging as a cause of progressive myelopathy and radiculopathy: A case series.**

Belinda O Marquis, Patrick Capone

Winchester Neurological Consultants Winchester, VA, USA

**BACKGROUND & PURPOSE:** Spinal arachnoid cysts are relatively rare and subtle lesions that produce neurologic deficits related to mass effect upon the spinal cord and nerve roots. These lesions can be an overlooked etiology of myelopathy and radiculopathy. Spinal arachnoid cysts can occur on a congenital basis or as a result of trauma or inflammation. Often occurring in the thoracic region, they can be associated with syringomyelia development related to abnormal CSF dynamics. The importance of a timely and accurate identification of these lesions may influence clinical outcomes and surgical management. This case series illustrates the imaging characteristics of symptomatic intradural spinal arachnoid cysts with MR and CT myelography.

**METHODS:** A case series of patients from our institution with a diagnosis of intradural arachnoid cyst were identified over a five year period. Cases were retrospectively reviewed. Diagnostic imaging techniques, included CT myelography and MRI, were reviewed in addition to clinical course and outcome.

**RESULTS:** Arachnoid cysts were identified primarily in the thoracic region. The presenting symptoms consisted of (myelopathy, paresthesia, and neuropathic pain). The patients underwent laminectomy and cyst fenestration. Clinical course and follow-up imaging were documented.

**CONCLUSIONS:** Spinal arachnoid cysts, though relatively rare, are an important treatable cause of myelopathy, radiculopathy, and gait disturbances. These lesions are subtle and frequently overlooked on modern imaging techniques. An adequate familiarity with the imaging characteristics of these lesions is warranted in order to optimize clinical decisions and outcomes.

#### **25. Activation by working memory in Parkinson's disease: Relationship to caudate dopamine levels**

Joseph C Masdeu, Daniel P Eisenberg, Catherine E Hegarty, Brett Cropp, Philip Kohn, Karen F Berman

National Institutes of Health Bethesda, MD, USA

**BACKGROUND & PURPOSE:** Working memory (WM) is impaired in Parkinson disease (PD) and there is some evidence that the impairment may be associated with reduced striatal dopamine synthesis. To further clarify the relationship between striatal dopamine synthesis and WM-related rCBF activation in PD, we used positron emission tomography (PET) to assess both measures in PD patients and in controls well matched by age, sex and performance.

**METHODS:** The N-back WM task was performed by PD patients who had been off PD drugs for at least 12 hours (N=15; mean age±SD=60±7; 25% women; average 2-back correct performance=65±18%) and by healthy controls (HC, N=24;

age=60±9; 26% women; 66±15% correct performance). Brain activation by the task was determined with 10mCi H<sub>2</sub><sup>15</sup>O rCBF PET scans, 7 for each condition. Presynaptic dopamine synthesis was also measured by PET, using 16 mCi of <sup>18</sup>F-fluorodopa (FDOPA) and a voxel-wise Patlak method with a cerebellar reference region.

**RESULTS:** PD patients had decreased striatal Ki values ( $p < 10^{-11}$ , FWE corrected). Some regions in the dorsolateral prefrontal cortex (DLPFC) tended to have less activation in the PD group ( $p < 10^{-3}$ , uncorrected). Moreover, the FDOPA-rCBF activation correlation analysis revealed several regions in the DLPFC where a positive relationship in patients contrasted with a negative relationship in controls, resulting in an interaction at  $p = 5 \times 10^{-4}$ , uncorrected.

**CONCLUSIONS:** The observed diagnosis-by-dopamine interaction effect on DLPFC WM activation affirms hypotheses of a link between striatal dopamine depletion and WM dysfunction in PD and furthermore demonstrates the inverted U pattern characteristically associated with dopamine D1 responses in the DLPFC.

## 26. Long term course of relapsing Reversible Cerebral Vasoconstriction Syndrome

Hesham Masoud<sup>1</sup>, Thanh Nguyen<sup>1</sup>, Alexander Norbash<sup>1</sup>, Meg Babikian<sup>1</sup>, Ashkan Shoamanesh<sup>2</sup>, Viken Babikian<sup>1</sup>

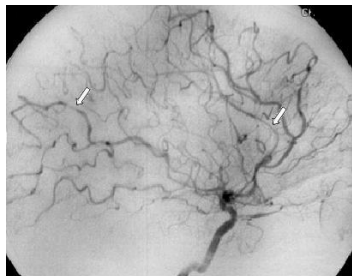
<sup>1</sup>Boston Medical Center Boston, MA, USA, <sup>2</sup>Massachusetts General Hospital Boston, MA, USA

**BACKGROUND & PURPOSE:** Reversible vasoconstriction syndrome (RCVS) describes reversible angiopathies presenting with recurrent, acute, and severe headaches during the first week after presentation, and both hemorrhagic and ischemic events during the first 2 weeks. Multifocal arterial vasoconstriction is detected on neuroimaging studies. Literature on the long term course of RCVS is sparse. We present a patient with chronic marijuana use and recurrent RCVS with three episodes occurring over 10 years of follow up.

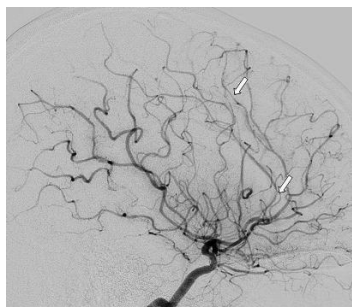
**METHODS:** Case report.

**RESULTS:** A 28 year old woman with known history of migraines and daily marijuana use first presented to our institution with sudden onset headache. She endorsed a similar history at age 21 limited details were available from that admission, however, a head CT demonstrated subarachnoid hemorrhage (SAH), a cerebral angiogram was suggestive of vasculitis but the leptomeningeal biopsy was negative for inflammation. On this presentation a CT head (CTH) demonstrated right frontal intraparenchymal and SAH. A cerebral angiogram disclosed segmental arterial narrowing in multiple vessels (Figure 1). She recovered completely back to her intact neurologic baseline. At age 32 she returned with recurrent sudden onset headache, CTH disclosed bifrontal and right parietal SAH. Angiography again demonstrated segmental arterial narrowing (Figure 2). She was managed with steroids and Nimodipine. At the time of her last visit she was neurologically intact.

**CONCLUSIONS:** We report a rare case of relapsing recurrent RCVS with long term follow up. RCVS can have a relapsing-remitting course in some patients.



2005 Cerebral angiogram (right internal carotid artery): multifocal anterior and middle cerebral artery branch stenosis



2009 Cerebral angiogram (right internal carotid artery): multifocal anterior cerebral artery stenosis

## 27. Neuroimaging Detected Neurocysticercosis and Neuropsychiatric Symptoms in Refractory Epilepsy

Aaron McMurtray<sup>1,2,3</sup>, Erin Saito<sup>3</sup>, Amanda Leon<sup>4</sup>, Karandev Rai<sup>1,2</sup>, Julia Morrow<sup>1,2</sup>, Natalie Diaz<sup>1,2,3</sup>, Bijal Mehta<sup>1,2,3</sup>, David Naylor<sup>1,2,3</sup>

<sup>1</sup>Harbor-UCLA Medical Center/Neurology Department Torrance, CA, USA, <sup>2</sup>David Geffen School of Medicine at UCLA/Neurology Department Los Angeles, CA, USA, <sup>3</sup>Los Angeles Biomedical Research Institute/Neurology Department Torrance, CA, USA, <sup>4</sup>Pitzer College Claremont, CA, USA

**BACKGROUND & PURPOSE:** Recent American Academy of Neurology (AAN) guidelines suggest treating parenchymal neurocysticercosis with a combination of albendazole and corticosteroids may reduce development of refractory epilepsy. This study was designed to determine if presence of parenchymal neurocysticercosis detected by conventional clinical neuroimaging studies was greater among refractory epilepsy patients compared to non-refractory epilepsy patients.

**METHODS:** Retrospective case series of twenty patients referred to a community based neurology clinic for treatment of refractory epilepsy during a one-year period and twenty controls with non-refractory epilepsy who presented during the same time period. All patients underwent history and physical examinations, CT brain imaging and standard laboratory tests. Presence of parenchymal neurocysticercosis was determined using standard radiologic criteria. Presence of neuropsychiatric symptoms including delusions, hallucinations and paranoia were determined by review of chart notes.

**RESULTS:** No significant differences were determined for frequency of structural brain lesions or for non-neurocysticercosis brain lesions. A trend was identified for increased likelihood of parenchymal neurocysticercosis among refractory epilepsy patients (likelihood ratio 2.185,  $p = 0.139$ ). Additionally, presence of parenchymal neurocysticercosis was associated with increased likelihood for delusions and paranoia (likelihood ratio = 4.267,  $p = 0.039$ ) and a trend was identified for increased likelihood of hallucinations (likelihood ratio = 5.578,  $p = 0.061$ ).

**CONCLUSIONS:** Neuroimaging detected neurocysticercosis is associated with increased likelihood of paranoia and delusions among refractory epilepsy patients. Consequently, treatment according to the AAN guidelines may reduce the frequency of neuropsychiatric symptoms among refractory epilepsy patients.

## 28. Case Report and Literature Review of Intramedullary Melanotic Schwannoma of the Thoracic Spinal Cord

Laszlo L. Mechtler<sup>1,2</sup>, Natalie M. Chapman<sup>1,2</sup>

<sup>1</sup>Roswell Park Cancer Institute Buffalo, NY, USA, <sup>2</sup>DENT Institute Buffalo, NY, USA

**BACKGROUND & PURPOSE:** Introduction: Discussed as one of the three variants to schwannomas, melanotic schwannomas are benign tumors, which arise from a common precursor for Schwann cells and melanocytes. Diagnosis of intramedullary melanotic schwannoma can be quite challenging due to the vague symptomatology and lack of current gold standard treatment modality in practice. These lesions are infrequently presented in the clinical setting due to the melanotic-producing component, location, and cause of spinal cord dysfunction symptoms. Correlational findings between advanced diagnostic imaging and pathology readily distinguish melanotic schwannoma from classic schwannoma. Case History: A 68-year-old male former-smoker presented with 2 ½ years of progressively worsening symptoms of numbness, tingling, and weakness in the lower left extremity accompanied by decreased reflexes. Both 3T MRI and STIR studies of the thoracic spine were performed. MRI study revealed heterogenous areas of mixed T1 and T2 signal changes at the T11 and T11-T12 levels (Figure 1). Diagnostic imaging characteristics for melanotic schwannomas reveal hyperintense signals on T1-weighted sequences and hypointense signals on T2-weighted sequences. Immunological differentiation of melanotic schwannoma from classic schwannoma includes nuclear expression for HMB-45 and Melan-A. Positive staining for S-100 is no longer pathogenic for differentiation, as both schwannomas express this protein. Post near total resection, the patient receives follow-up imaging every 3 months, as melanotic schwannomas are the only variant of schwannomas with the possibility to behave erratically and become metastatic.

**METHODS:**

**RESULTS:**

**CONCLUSIONS:**



## 29. Single Balloon Microcatheter technique for coiling wide necked aneurysms: A Case Series

Sonal Mehta, Connor J Einertson , Randall Edgell  
St Louis University Hospital St Louis, MO, USA

**BACKGROUND & PURPOSE:** Coil embolization of wide necked cerebral aneurysms frequently requires the use of stents and temporary occlusion using non-detachable compliant balloons. The traditional technique of balloon assisted coiling involves the use of two microcatheters, which may be associated with greater thromboembolic complications. We describe a series of coil embolizations performed using a single microcatheter balloon technique to treat wide-necked aneurysms. In this technique the coils were delivered through a balloon microcatheter with a coaxial dual-lumen design with the balloon inflated at the aneurysm neck.

**METHODS:** A retrospective chart review was performed to identify cases in which the Ascent balloon (Codman, Raynham, MA) was used for aneurysm coil embolization as a single balloon microcatheter. Clinical, demographic and angiographic data were obtained.

**RESULTS:** Five cerebral aneurysms were treated using the single balloon microcatheter technique. Four of these were unruptured whereas one was ruptured. All aneurysms were large (maximum diameter 6 mm or greater), with an average maximum diameter of 7.8 mm, an average neck diameter of 3.5 mm, and average volume of 154.7 mm<sup>3</sup>. Complete occlusion with coil embolization (RROC I) was achieved in all cases. The average packing density was 42.44%. High PD (>22%) was achieved in 4 cases whereas moderate PD (12-22%) was achieved in one case.

**CONCLUSIONS:** This initial experience demonstrates the feasibility and immediate outcomes of a single balloon microcatheter technique in coil embolization of wide-neck cerebral aneurysms. This technique may be used to achieve high packing density while avoiding permanent stent placement and potentially reducing thromboembolic complications.

### 30. WITHDRAWN

### 31. WITHDRAWN

### 32. Effect of Rajyoga Meditation: A Resting State Simultaneous EEG-fMRI Study

Rajanikant Panda<sup>1</sup>, Rose Dawn Bharath<sup>1</sup>, Mangalore Sandhya<sup>1</sup>, Neeraj Upadhyay<sup>1</sup>, Silpa Kanungo<sup>1</sup>, Arumugam Thamodharan<sup>1</sup>, Shobini L Rao<sup>2</sup>, Arun Kumar Gupta<sup>1</sup>

<sup>1</sup>Dept. of Neuroimaging & Interventional Radiology, National Institute of Mental Health and Neuro Science Bangalore, India, <sup>2</sup>Clinical Psychology, National Institute of Mental Health and Neuro Science Bangalore, India

**BACKGROUND & PURPOSE:** Understanding the role of brain in bringing about awareness and consciousness has always been a challenging area of neuroscience and an impressive debate on effect of meditation in various aspects. Our study aims at understanding the effect of Rajyoga-Meditation. We hypothesized that effect of Rajyoga-Meditation may be visualized using EEG-fMRI as changes in neuro-hemodynamic correlates.

**METHODS:** We studied twenty male long term (more than 10 years) Rajyoga Meditators (RMs) and twenty healthy control (HCs) with the mean age of 30 (SD 10) year using EEG-fMRI .We used functional magnetic resonance imaging(fMRI) for examining the default mode network(DMN) and Electroencephalography(EEG) derived quasi-stable states known as EEG-microstates to examining the brain stability over the time. The EEG-microstates were convolved with resting fMRI to understand the changes in meditators compared with healthy controls.

**RESULTS:** We noted that the long term meditators have lower intensity with lesser number of voxel in medial prefrontal cortex(MPFC), posterior cingulate cortex(PCC) as compared to healthy people at rest and this activity was further reduced during meditation where as increased in medial temporal cortex (MTC). The average duration of EEG-microstate corresponding to DMN, in healthy control was 80ms (30ms to 240ms) and mediators was 90ms (50ms to 310ms). This significantly increased to 120ms (70ms to 370ms during meditation.

**CONCLUSIONS:** EEG-fMRI is a valuable in understanding the effects of meditation. Decrease DMN and Increase in the duration of EEG-microstates could suggest increased brain stability, less ruminative thought in meditators. Increased MTC in DMN network is indicative of a better cognitive process.

### 33. Brain Functional Connectivity of Learning Memory: An fMRI Study

Rajanikant Panda<sup>1</sup>, Rajakumari P Reddy<sup>2</sup>, Neeraj Upadhyay<sup>1</sup>, Thamodharan Arumugam<sup>1</sup>, Silpa Kanungo<sup>1</sup>, Shobini L Rao<sup>2</sup>, Jamuna Rajeswaran<sup>2</sup>, Arun Kumar Gupta<sup>1</sup>, Rose Dawn Bharath<sup>1</sup>

<sup>1</sup>Dept. of Neuroimaging & Interventional Radiology, National Institute of Mental Health and Neuro Science (NIMHANS) Bangalore, India, <sup>2</sup>Dept. Clinical Psychology, National Institute of Mental Health and Neuro Science (NIMHANS) Bangalore, India

**BACKGROUND & PURPOSE:** Learning memory is a crucial cognitive function. We aimed to examine brain connectivity for visual learning memory encoding and retrieval using functional magnetic resonance imaging(fMRI).  
**METHODS:** Thirty right handed healthy normal volunteers in the mean age of  $23.67 \pm 4.53$  years and no of years of education was  $16.58 \pm 2.8$  years were recruited. A block design paradigm consisting of four active blocks and four rest block was presented. First active block had ten pictures representing visual learning in which the subject was instructed to remember each of the pictures(encoding) in order to identify the similar picture in the next active block(retrieval). In response to a repeating picture in the retrieval block the subject was instructed to give the response. fMRI with EPI sequence(TR: 3000, 160 dynamics) and MPRAGE were acquired. Region of interest based(ROI) connectivity of fMRI was processed using SPM8 & CONN toll box with  $p < 0.05$  False Discovery Rate(FDR) correction.  
**RESULTS:** We noted that there was greater connectivity during retrieval than encoding. Posterior cingulate cortex(PCC) ROI was connected with many regions especially dorso-lateral prefrontal region(DLPFR) and supramarginal gyrus as evidenced by their positive correlation and negative correlation of PCC region and MPFC which associate with Default mode network(DMN). Inhibition of DMN was more in encoding compare to retrieval in other hand The DLPFR and supramarginal gyrus activations were found to be increased in retrieval.  
**CONCLUSIONS:** Our results suggest that the associative brain areas for retrieval are greater than encoding. Higher level of cognitive process such as retrieval will reduce negative inhibition of DMN.

### 34. A Case of Assimilation of the Atlas

Thomas J Pfiffner, Ronak Jani, Laszlo Mechtler  
DENT Neurologic Institute Amherst, NY, USA

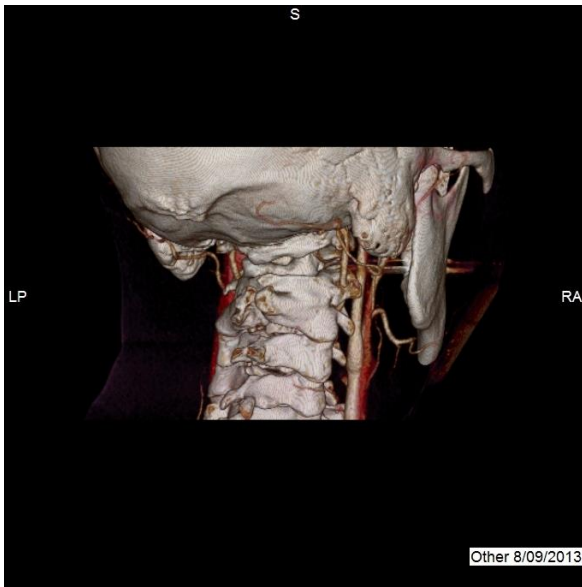
**BACKGROUND & PURPOSE:** A 40-year-old male without any significant previous medical history presented with three months of intermittent visual disturbances, followed by headaches, which had been becoming more frequent. He also had one episode of right arm numbness during one of these spells. MRI of the brain was performed, which showed fusion of the C1 arch to the skull base with enlargement of the left lateral mass and clivus, and narrowing of the foramen magnum with left to right displacement and compression of the cervicomedullary junction. Imaging also revealed congenital block between C2 and C3. CT of the skull base was then performed to better characterize the bone elements of this malformation, and MRI of the cervical spine was ordered to evaluate for further cervical spine anomalies. Subsequently, CT angiogram with 3D reconstruction was performed for evaluation of the surrounding vasculature, and for neurosurgical purposes, whom the patient was referred to. Occipitalization of the atlas, also known as assimilation of the atlas, or atlanto-occipital fusion is one of the most common osseous anomalies of the craniovertebral junction. The reported prevalence in the general population ranges from 0.08% to 2.76%, with males and females equally affected. It may occur in isolation, or can be associated with other anomalies, and/or syndromes. The patients with craniovertebral joint anomalies exhibit the first neurological signs and symptoms usually no sooner than the second decade of life. In cases of neural impairment, decompression (suboccipital craniectomy and upper cervical laminectomy) with occiput-to-axis arthrodesis is usually required.

**METHODS:**

**RESULTS:**

**CONCLUSIONS:**





### **35. Conversion of Posterior reversible encephalopathy syndrome into irreversible cytotoxic edema and acute infarct.**

Ramnath Santosh Ramanathan, Konark Malhotra, Zain Guduru, Nawal Shaikh, Sandeep Rana

Neurology, Allegheny General hospital, Drexel University College of Medicine, Allegheny Health Network. Pittsburgh, PA, USA

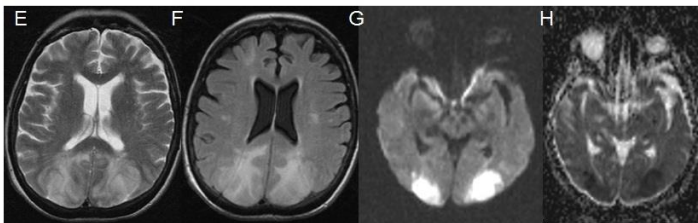
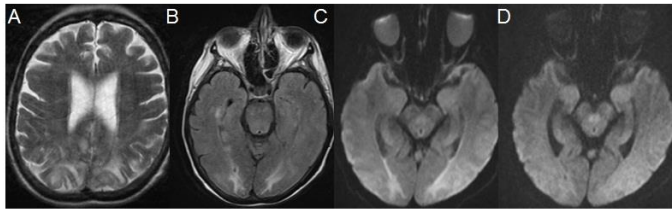
**BACKGROUND & PURPOSE:** Posterior reversible encephalopathy syndrome (PRES) consists of reversible vasogenic edema in the posterior circulation territories, although conversion to irreversible cytotoxic edema can occur. When promptly recognized and treated, the symptoms and radiologic abnormalities can be completely reversed. When unrecognized, the patient's condition can progress to ischemia, massive infarction, and death.

**METHODS:** We present a 70-year-old female with history of hypertension admitted with seizures and altered mental status. On initial exam patient had no focal neurological deficits.

**RESULTS:** Magnetic resonance imaging (MRI) brain done initially showed hyperintensities in the bilateral occipital, posterior parietal, and cerebellar hemispheres, thought to be postictal changes. About 2-3 weeks ago, patient's blood pressure medication had been stopped. Patient's blood pressure was on the higher side in the range of 170-180 mmHg during hospitalization. Repeat MRI brain done 6 days later as patient's mental status change persisted, showed numerous posterior circulation infarctions with bilateral frontal and parietal white matter and cortical infarction. Lumbar puncture was normal and EEG showed mild background slowing.

**CONCLUSIONS:** MRI with diffusion-weighted images (DWI) provides not only a powerful means of diagnosing PRES but also aids in prognostic information. The hallmark of PRES is vasogenic edema in the territories of the posterior circulation which is reversible. DWI may show foci of high signal intensity in cortex that is either undergoing infarction or at high risk of infarction. The extent of T2 and DWI signal intensity correlates well with patient outcome and can help guide more aggressive treatment in more severely affected patients.





### 36. Tumefactive Demyelination: Biopsy dilemma.

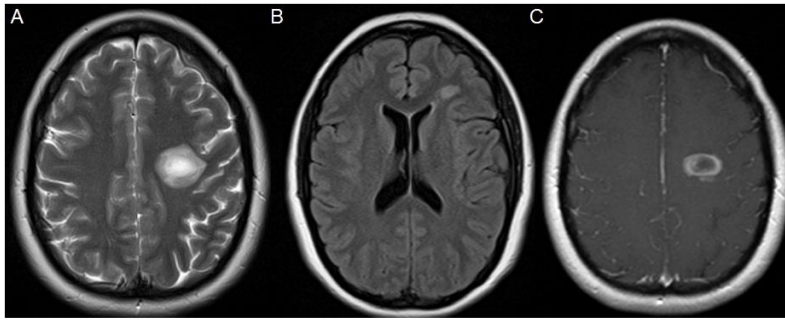
Ramnath Santosh Ramanathan, Konark Malhotra, Zain Guduru, Nawal Shaikh, Sandeep Rana  
Neurology, Allegheny General hospital, Drexel University College of Medicine, Allegheny Health Network. Pittsburgh, PA, USA

**BACKGROUND & PURPOSE:** Tumefactive demyelinating lesion is a rare atypical form of multiple sclerosis (MS) which presents as solitary lesions measuring about 2cm or larger on magnetic resonance imaging (MRI) brain. It can mimic neoplasms, cerebral abscess or stroke. About 50% of tumefactive lesions show ring enhancement which is usually in the form of an open ring and the incomplete portion of the ring is on the gray matter side of the lesion

**METHODS:** We present a 35-year-old female with history of hypothyroidism who came with a complaint of right facial droop, blurred vision, and right upper extremity weakness for 10 days. She also had slurred speech and episodes of expressive aphasia. On neurology examination patient had tight 7<sup>th</sup> facial palsy and right sided weakness.

**RESULTS:** MRI brain revealed focal areas of abnormal signal intensity in the cerebral white matter with the larger enhancing lesion at the left centrum semiovale measuring 2.8 x 2.5 cm. with additional 1.2 x 0.7 cm focal area of abnormal T2 signal in the white matter of the left frontal lobe.

**CONCLUSIONS:** The term 'tumefactive MS' is applicable when the clinical presentation and MRI findings are indistinguishable from those of a brain tumor. Tumefactive lesion can be diagnosed using spectroscopy and positron emission tomography (PET). Biopsy should be avoided and careful follow-up by serial MRI is sufficient to establish the diagnosis. In general, tumefactive demyelinating lesions respond well to steroids and no radiological evidence of new lesions is identified after the treatment in most patients.



### **37. Acute necrotizing vasculitis mimicking glioblastoma multiforme in a patient with neuromyelitis optica.**

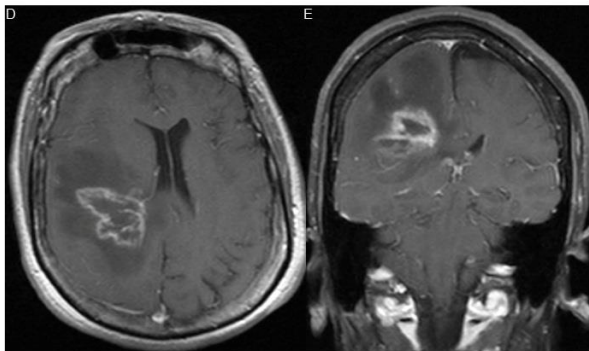
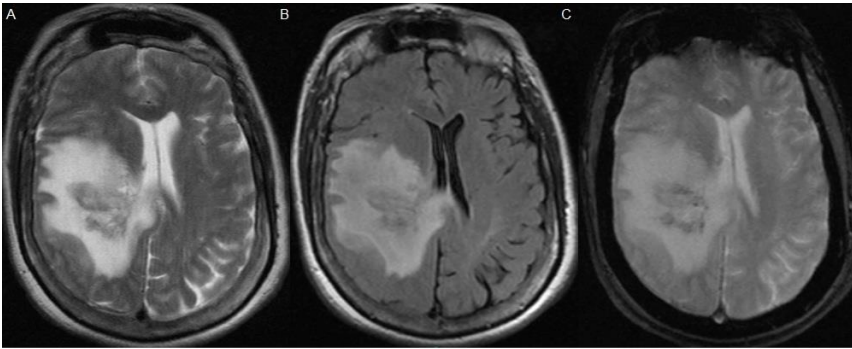
Ramnath Santosh Ramanathan, Konark Malhotra, Laxmi Shah, Edwards J Gettings, Nawal Shaikh, Sandeep Rana  
Neurology, Allegheny General hospital, Drexel University College of Medicine, Allegheny Health Network. Pittsburgh, PA, USA

**BACKGROUND & PURPOSE:** Neuromyelitis optica (NMO) is a demyelinating disease of the central nervous system characterized by optic neuritis and myelitis. The association of NMO with other autoimmune disease like lupus has been reported but the association with vasculitis is not described.

**METHODS:** We present a 51 year female with history of NMO who noticed new-onset left-sided weakness and sensory deficits.

**RESULTS:** Magnetic resonance imaging (MRI) brain with contrast showed aggressive ring enhancing mass in the posterior right frontoparietal region measuring 3.5x2.7x2.5 cm with mass effect, partial enhancement of left lateral ventricle, medialization of the right uncus and extensive vasogenic edema suspicious for high-grade glioma such as glioblastoma multiforme. Patient underwent brain biopsy which revealed acute necrotizing vasculitis with small vessel transmural inflammation and fibrinoid necrosis. Patient was treated with rituximab with a plan to add on treatment with cyclophosphamide.

**CONCLUSIONS:** Central nervous system (CNS) necrotizing vasculitis is a rare but potentially life threatening disease characterized by inflammation of the vessels. It is not reported to be directly a component of NMO. Brain and meningeal biopsy is the gold standard for the diagnosis of CNS vasculitis as it helps in identifying the characteristic pathology and also exclude other disorders like lymphoproliferative diseases, infections or sarcoidosis. In our patient necrotizing vasculitis appeared to be isolated angitis with tumor-like lesion and extensive necrosis, mimicking high-grade glioma on MRI. Though primary CNS angitis is a devastating disease, the prognosis in small-vessel primary angitis of the CNS (angiogram negative) is reported to be favorable.



### 38. WITHDRAWN

### 39. WITHDRAWN

### 40. Unilateral Subarachnoid Hemorrhage and Ipsilateral Retinal Hemorrhage in Infants

Joseph M Scheller, Patrick Capone

Winchester Medical Center Winchester, VA, USA

**BACKGROUND & PURPOSE:** Retinal hemorrhage in the setting of subarachnoid hemorrhage in adults is known as Terson Syndrome. The finding can be seen in traumatic, spontaneous, and aneurysmal subarachnoid hemorrhage. In young children the association of retinal hemorrhage and subarachnoid hemorrhage is typically thought to be consistent with abusive head injury. We reviewed our cases of infantile unilateral subarachnoid hemorrhage to determine if there were associated ipsilateral retinal hemorrhages.

**METHODS:** Medical records and MRI scans were reviewed in medicolegal cases of infants who had intracranial bleeding and were suspected of being victims of abuse. Infants who had skull fractures, bilateral subarachnoid hemorrhage, and bilateral retinal hemorrhages were excluded.

**RESULTS:** Five infants were found to have unilateral subarachnoid hemorrhage with ipsilateral retinal hemorrhage. In all cases abusive head injury was assumed by the clinicians and legal proceedings ensued.

**CONCLUSIONS:** Unilateral subarachnoid hemorrhage in infants without skull fracture can be associated with ipsilateral retinal hemorrhage. This finding argues against a shaking mechanism for retinal hemorrhage and is more consistent with that of Terson syndrome in adults.

#### 41. Embolic stroke post ablation due to atrioesophageal fistula.

Nawal Shaikh, Ramnath Santosh Ramanathan, Nnamdi Dike, Konark Malhotra, Sandeep Rana

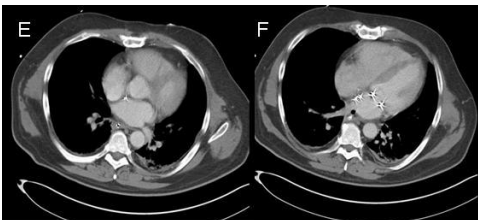
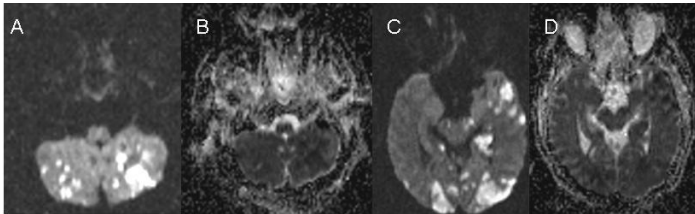
Neurology, Allegheny General Hospital, Drexel university College of Medicine, Allegheny Health Network Pittsburgh, PA, USA

**BACKGROUND & PURPOSE:** Atrioesophageal fistula (AEF) is a rare cause of stroke that neurologists do not encounter often since ablations are not done that routinely. Additionally, AEF is an uncommon complication of ablation. Treatment for the resulting stroke is crucial but unfortunately convoluted because it is difficult to differentiate whether cause is purely septic emboli, air emboli or combination.

**METHODS:** A 57 year old Caucasian male with history of previous ischemic stroke, hypertension, diabetes, coronary artery disease status post bypass with mitral valve repair, patent foramen ovale closure, atrial fibrillation status post pulmonary vein ablation on coumadin presented with sudden onset of fever, nausea, vomiting, diarrhea and altered mental status 4 weeks after the ablation procedure. He had mild fluctuating left sided weakness and left facial droop on exam and the next day developed hematemesis with lower GI bleed.

**RESULTS:** CT head showed no evidence of acute transcortical infarct. CT angiogram head and neck perfusion was unremarkable. MRI brain showed numerous regions of restricted diffusion within the bilateral cerebral and cerebellar hemispheres as well as within the brainstem, consistent with acute embolic infarcts. CT chest with contrast showed minimal pneumomediastinum with indistinct fat planes between the left atrium and esophagus suggestive of AEF.

**CONCLUSIONS:** Perioperative period around ablations is critical as fatal complications like AEF can occur despite being on anticoagulation causing strokes via multiple mechanisms. Intermittent transient ischemic attacks (TIAs) post ablative procedures should be promptly evaluated by CT chest with contrast and if possible barium swallow for early identification of AEF.



#### 42. Rhombencephalosynapsis as an incidental finding in an adult with head trauma

Lakshmi Shankar<sup>1,2</sup>, Hongyan Li<sup>2</sup>

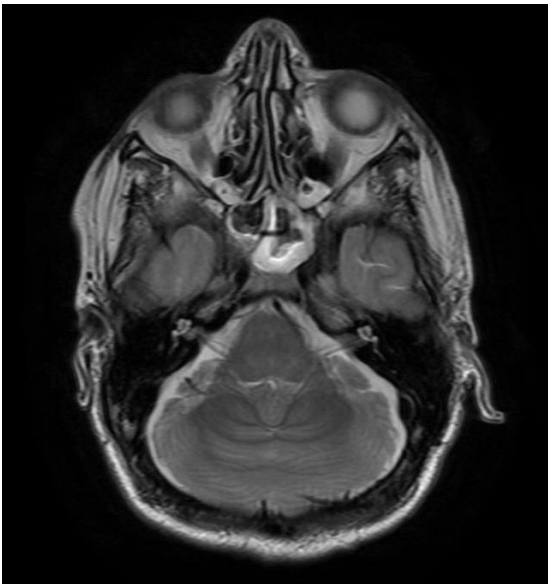
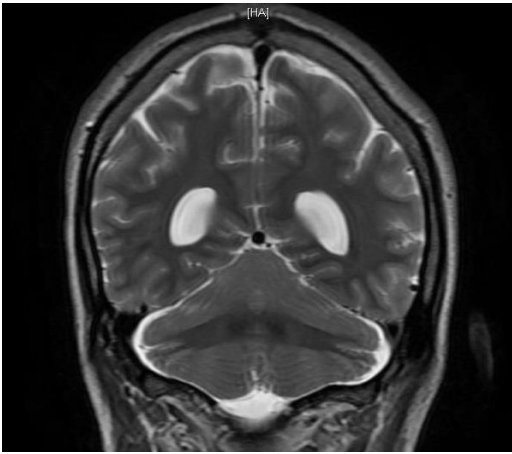
<sup>1</sup>Cleveland Clinic Foundation Cleveland, OH, USA, <sup>2</sup>University of Toledo Toledo, OH, USA

**BACKGROUND & PURPOSE:** Rhombencephalosynapsis is a rare congenital midline brain abnormality characterized by dorsal fusion of cerebellar hemispheres, agenesis or hypogenesis of the vermis, fusion of dentate nuclei and superior cerebellar peduncles with variable supratentorial involvement. Clinical presentation can be of varying severity. This has been most commonly described in the pediatric age group.

**METHODS:** Case report

**RESULTS:** A 36 year old right handed man presented with headache and unsteady gait after head trauma due to assault. History was positive for alcohol use. Clinical examination showed scanning dysarthria, saccadic eye movements, spontaneous and gaze-evoked nystagmus, dysmetria and ataxia in both upper and lower extremities, and broad based ataxic gait with tendency to fall to either side. Patient and his mother noted some minor problems with balance since childhood. MRI Brain showed fusion of the cerebellar hemispheres, hypoplasia of posterior cerebellar incisures, Hypoplastic nodulus, mild ventriculomegaly with abnormally shaped 4<sup>th</sup> ventricle, residual anterior vermis at the level of junction of aqueduct and 4<sup>th</sup> ventricle, residual posterior vermis and unremarkable superior medullary velum, aqueduct and pons. No forebrain abnormalities were noted.

**CONCLUSIONS:** Alcohol use likely exacerbated preexisting cerebellar findings in this adult patient with Rhombencephalosynapsis.



#### 43. Acute Paradoxical Embolic Ischemic Stroke Related to Intravenous Line Pressure Injection in a Patient with

## Superficial Thrombophlebitis

Lakshmi Shankar, Russell Cerejo, Mei Lu  
Cleveland Clinic Foundation Cleveland, OH, USA

**BACKGROUND & PURPOSE:** Paradoxical embolic stroke can occur in right to left shunt, most commonly with deep venous thrombosis. The incidence of acute ischemic stroke with superficial venous clots is relatively low, likely due to presence of competent venous valves. Pressure injection through IV access distal to a thrombus could increase the chance of embolic stroke in the presence of a right to left shunt.

**METHODS:** Case report

**RESULTS:** A 67-year-old-female admitted for chest pain, complained of seeing 'shimmering lights' for less than a minute immediately after pressure injection of a radio-tracer through right arm IV access. Two weeks prior she had a similar episode when another medication was pressure injected through an IV access in the same arm. She had no other neurological complaints and neurological exam was normal. MRI Brain showed bilateral hemispheric sub-centimeter sub-acute ischemic strokes. Work-up revealed acute superficial thrombophlebitis in right median cubital vein (proximal to IV access) and great saphenous vein near the sapheno-femoral junction (site for previous vein graft for coronary artery bypass graft surgery). Transthoracic echocardiogram and transcranial doppler were positive for a right to left circulatory shunt through a patent foramen ovale. IV access was switched to the left arm and no further episodes were noted with use of the new IV access. She was placed on anticoagulation therapy for acute superficial thrombophlebitis which was a possible cause of the ischemic strokes.

**CONCLUSIONS:** This case illustrates a cause for paradoxical embolic stroke due to IV line related thrombosis in the superficial venous system.

## 44. Brain Networks Underlying visual perception of ambiguous figures: A study with fMRI and dynamic causal modelling.

Hariom Sharma<sup>1</sup>, Rekha varrier<sup>2</sup>, Shripad Kondra<sup>3</sup>, Prasun K Roy<sup>4</sup>

<sup>1</sup>NIMHANS Bangalore, India, <sup>2</sup>NBRC Gurgaon, India, <sup>3</sup>Mando Softtech India Pvt. Ltd. Bangalore, India, <sup>4</sup>NBRC Gurgaon, India

**BACKGROUND & PURPOSE:** How visual perception of ambiguous figures was processed in brain and which networks were activated. To detect unusual perception at a subclinical level, the inkblot test has been used as a diagnostic and research tool for the past 90 years (Rorschach, 1921 Ganellen, 1996 Jorgensen et al., 2000 Kircher et al., 2001 Exner, 2003 Jimura et al., 2009) .

**METHODS:** A total of 7 healthy volunteers (4 females and 3 males) ranging in age from 18 to 25 years participated in the study. A total of ten ambiguous figures were shown to the subjects in two experimental runs. A block design paradigm was used in fMRI experiment. The duration of stimuli exposure was constant at 15 seconds and 10 seconds for fixation.

**RESULTS:** We were extracted two networks of effective connectivity. One of them was task positive and the other one was task-negative network. Task positive network of effective connectivity informed, information of visual perception diverge from visual (BA 19) to frontal area (BA 9), processed this visual information in two networks, frontal (BA 6,9,10,11,44) and fronto-parietal (BA 7,23,9,10). These Signals are presumably attributed for perceptual changes. Other network of effective connectivity is task negative network, probably it is responsible for visual imagination.

**CONCLUSIONS:** We attempted to utilize the ICA and DCM techniques to portrait the effective connectivity showing flow of information for the visual perception of ambiguous figures, succeed to find out the task positive and negative networks.



## 45. Cerebral Vasospasm Following Transsphenoidal Pituitary Macroadenoma Resection. Case Report.

Yazan M. Suradi<sup>1</sup>, Crystal Dixon<sup>2</sup>, David Rose<sup>3</sup>

<sup>1</sup>University of South Florida Tampa, FL, USA, <sup>2</sup>University of South Florida Tampa, FL, USA, <sup>3</sup>University of South Florida Tampa, FL, USA

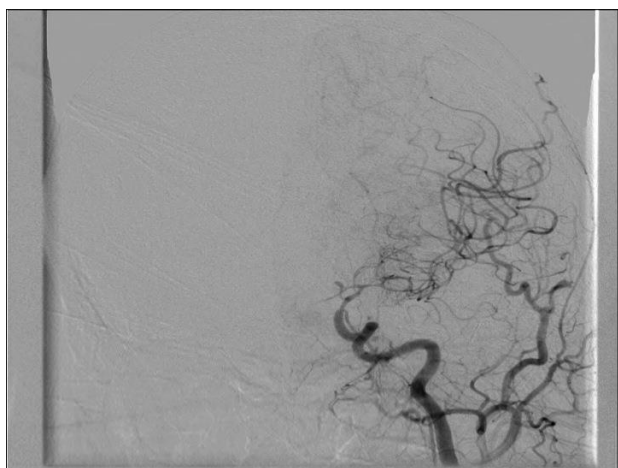
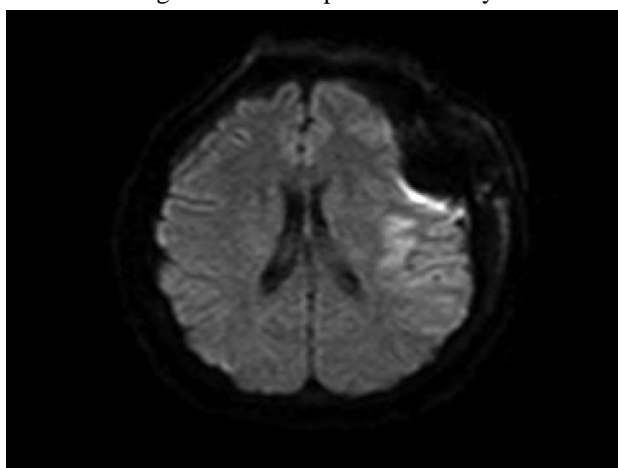
**BACKGROUND & PURPOSE:** Cerebral vasospasm (CV) frequently occurs subsequent to aneurysmal-subarachnoid-hemorrhage and is responsible for significant neurological deterioration and morbidity. However, CV following

transcranial pituitary adenoma resection has been extremely infrequent, with only few cases documented. Consequently, CV and its management has remained a great challenge ever since its initial report in 1951.

**METHODS:** A 19 year-old female with a known history of pituitary-macroadenoma with secondary Cushing's disease, status-post transsphenoidal resection at age eighteen, presented with difficulty speaking and right arm weakness. The symptoms began seven-days after left-sided fronto-temporal craniotomy with orbital osteotomy, carried-out for supplementary resection of the cavernous-sinus adenoma. Neurological examination revealed decreased motor-strength in right-upper-extremity and expressive aphasia. NIH-Stroke-Scale-Score was 11.

**RESULTS:** Brain-MRI confirmed acute stroke in the distribution of the left-middle-cerebral (MCA) and left anterior-cerebral (ACA) arteries. Head-MRA showed narrowing of left proximal M1-MCA and A1- ACA, which was concerning for vasospasm. Therefore, triple-HHH therapy was initiated immediately. Concurrently, the patient was transported to the angiography-lab for intra-arterial (IA) verapamil and nicardipine treatment. Over the next few days, IA-treatment was repeated nine times. Though each IA-treatment offered symptomatic and angiographic improvement, occasionally symptoms would recur afterward. Still, the weakness and aphasia markedly improved by the time of discharge.

**CONCLUSIONS:** The pathogenesis of CV after tumor-surgery is not very well understood. Various etiologies associated with CV status-post surgery include direct arterial wall damage, blood deposition in the basal cisterns, aseptic meningitis and/or release of chemical substances during tumor resection. Management can be very challenging therefore the key to success is a high-index-of suspicion and early intervention.



#### 46. Utility of brain MRI in the diagnosis of Vogt–Koyanagi–Harada syndrome

Reubela Mari Valenzuela, Jorge C Kattah

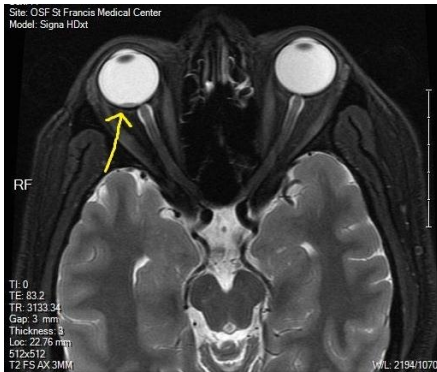
University of IL College of Medicine Peoria Peoria, IL, USA

**BACKGROUND & PURPOSE:** Vogt Koyanagi Harada syndrome (VKH syndrome) is a rare disease predominantly affecting women with an incidence of 1 to 6 per million in the US. The diagnosis is made clinically, however fluorescein angiography (FA) and optical coherence tomography (OCT) are used to support the diagnosis. Brain MRI is not a common imaging modality, however in the absence of FA and OCT, it can be helpful in the diagnosis.

**METHODS:** This is a case report where extensive review of history, laboratory evaluation and imaging of VKH syndrome is performed.

**RESULTS:** A 32 year old man with vitiligo presents with headache and progressive right vision (OD) loss to almost counting finger (CF). Past medical history is unremarkable and he denies ocular trauma. Fluorescein angiography shows focal areas of leakage in the retinal pigment epithelium while the brain MRI shows fluid collection in the choroid of the right eye with some meningeal enhancement. Prednisone was initially started, however because of persistent hyperglycemia, azathioprine was initiated while prednisone was tapered. Vision improved from CF to 20/20 OD while the left eye remained unaffected.

**CONCLUSIONS:** Since VKH syndrome presents diversely, ancillary procedures like FA, ultrasound and OCT are commonly employed to arrive at a diagnosis, however the unavailability of OCT and FA in the rural setting makes this difficult. Brain MRI is useful especially in the absence of FA and OCT. The most distinguishing MRI feature of VKH syndrome include choroidal and retrobulbar contrast enhancement in the orbits, white matter abnormalities on FLAIR and meningeal enhancement.



#### 47. Assessment of Brain Plasticity Induced by rTMS in Patient with Writer Cramp Using Resting State Connectivity

Bhaskar M Venkateshappa<sup>1</sup>, Rose D Bharath<sup>1</sup>, Arun K Gupta<sup>1</sup>, Pramod K Pal<sup>2</sup>, Rajanikanth Panda<sup>1</sup>, Ketan jhunjunwala<sup>2</sup>

<sup>1</sup>Department of NIIR, NIMHANS Bangalore, India, <sup>2</sup>Department of Neurology, NIMHANS Bangalore, India

**BACKGROUND & PURPOSE:** Writer's cramp (WC) is a task-specific form of focal dystonia. The pathophysiology related to abnormal intrinsic functional connections in the brain can be modulated by low frequency transcranial magnetic stimulation (rTMS) to increase the connectivity and hence improve symptoms of WC.

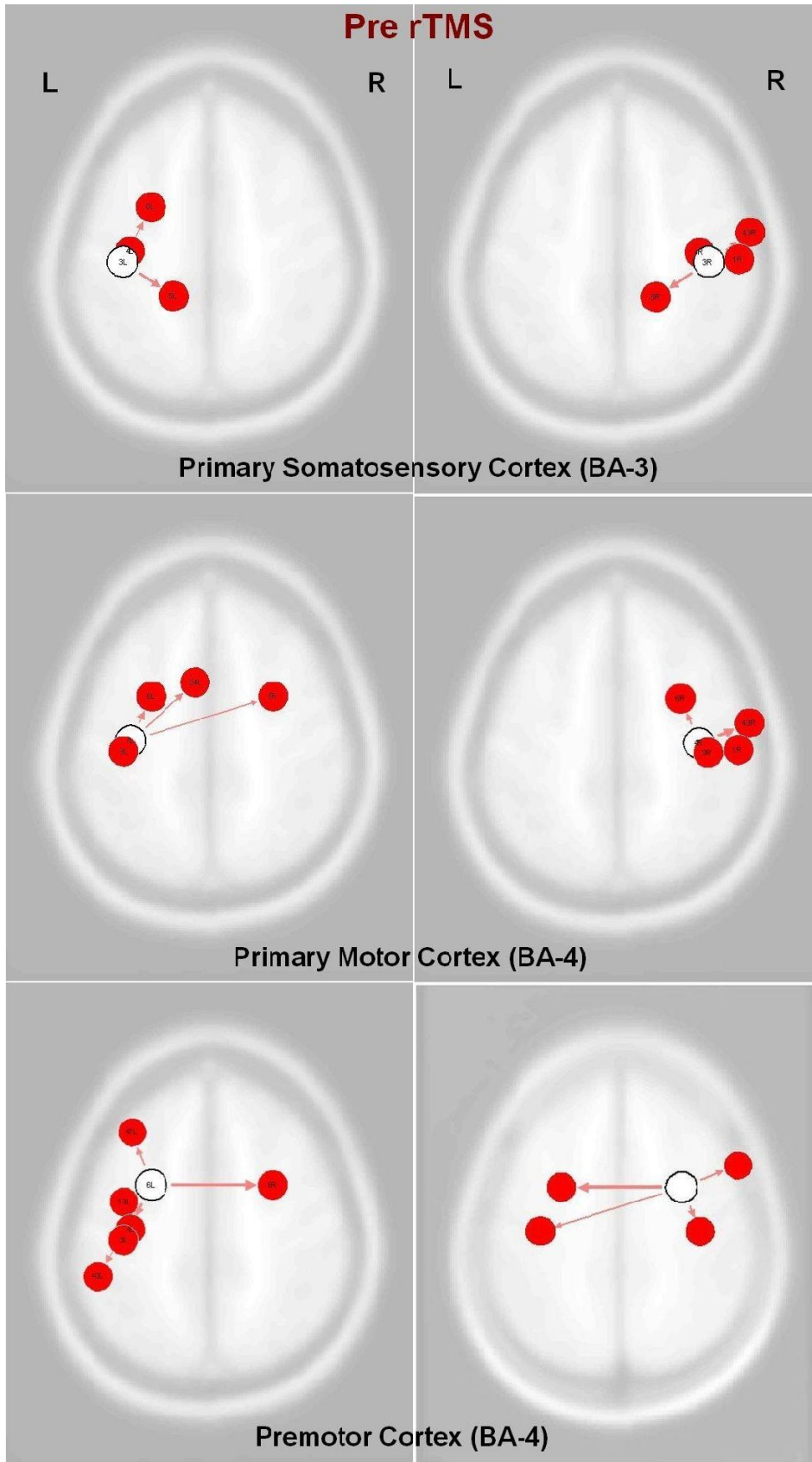
**METHODS:** A prospective study of twenty subjects, ten WC patients and ten age and gender matched healthy subjects using resting-state EEG-fMRI. 1Hz rTMS, (900 pulses for 15 minutes) given in the dominant sensory motor cortex. All subjects were evaluated with pre and post rTMS using 3T MRI and 32-channel MR compatible EEG. All were instructed to lie-down with eye closed, awake and relaxed state. fMRI with EPI sequence (TR: 3000, 180 dynamics), MPRAGE and EEG were acquired. The resting state functional connectivity of the sensory motor networks (Brodmann Areas 3, 4, 6) were computed. Region of interest based connectivity of fMRI was processed using SPM 8 & CONN toolbox with  $p < 0.05$  FDR correction and connectivity of EEG was processed using EEGLAB toolbox.

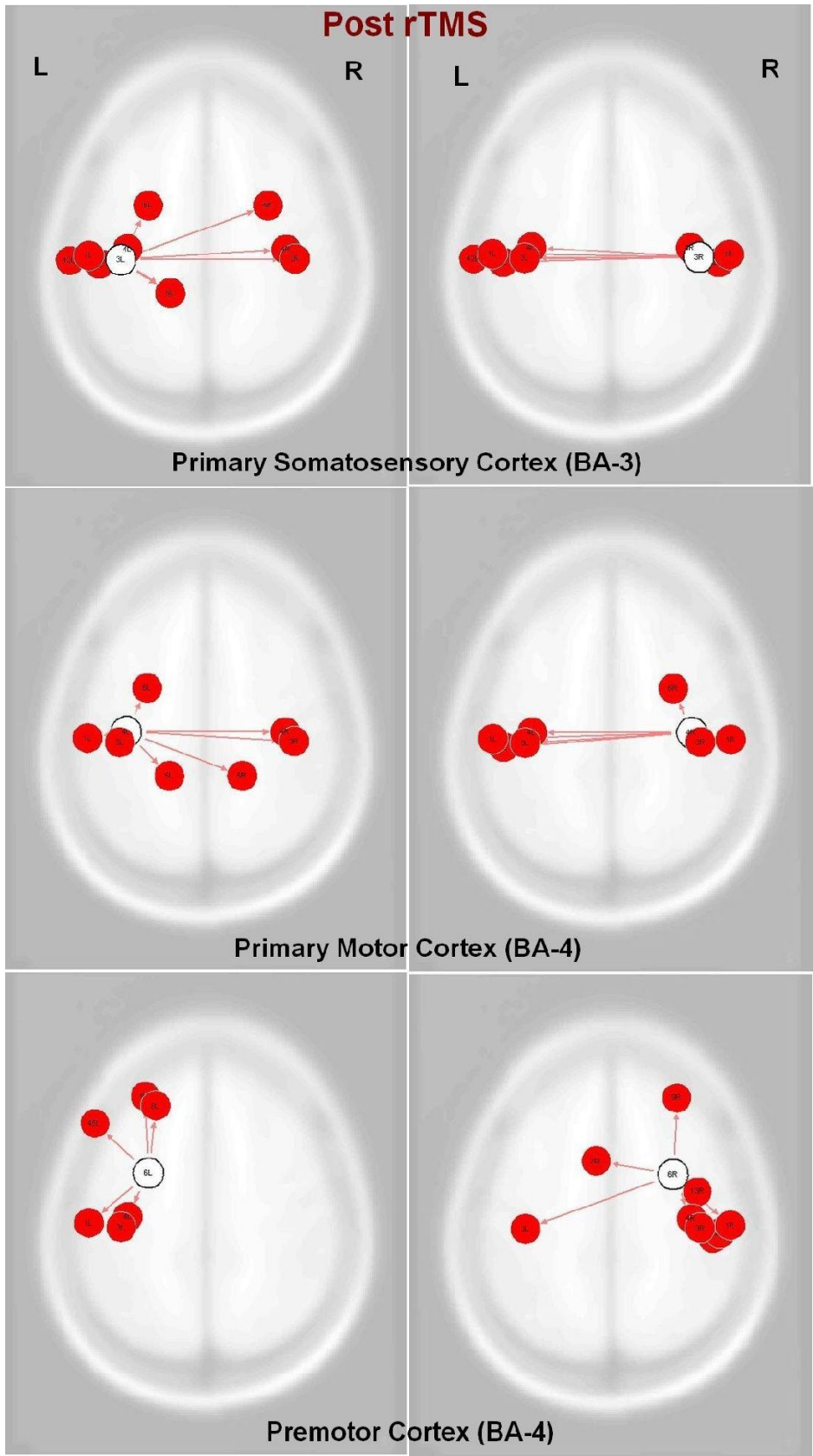
**RESULTS:** In resting state EEG-fMRI, connectivity of the sensory motor area decreased in all WC patients. Post rTMS, increase in connectivity not only on dominant side but also the both hemisphere of sensory motor cortex, as seen in the healthy controls.

**CONCLUSIONS:** EEG-fMRI is a valuable technique in understanding the effects of rTMS in patient with WC. 1 Hz



rTMS consistently improves the impaired connectivity of the sensory motor cortex as well the beta spectral power in the EEG which is comparable to the normal subjects.





48. Recurrent spells of unresponsiveness secondary to bilateral carotid stenosis caused by giant cell arteritis

Mervat N Wahba  
Neurology Memphis, TN, USA

**BACKGROUND & PURPOSE:** Occlusive lesions of the internal carotid artery (ICA) constitute the commonest cause of cerebrovascular accidents. They are usually atherosclerotic in origin, although occasionally other causes such as dissection, fibromuscular dysplasia, or vasculitic process may be etiogenic. Bilateral ICA stenosis is a particularly devastating condition with an annual stroke rate of 7.6% per year and an annual mortality of 43%.

**METHODS:** A 63-year-old man presented with of recurrent spells of falling to the ground triggered by an upright position. This may be associated with shaking of the extremities. No epileptogenic or cardiac etiology was found.. A CT angiogram showed over 90% stenosis of the bilateral internal carotid arteries at the siphon. He was recently diagnosed with giant cell arteritis . He was placed on prednisone.

**RESULTS:** The patient's constitutional symptoms and jaw claudication improved on prednisone but he continued to have the episodes of altered consciousness with brief jerking of the limbs. A brief course of anticoagulation was tried with some improvement but no resolution of his episodes. Bilateral angioplasty of his carotid arteries was performed with resolution of his symptoms. Stroke risk factors were addressed.

**CONCLUSIONS:** The presence of bilateral carotid stenosis in patients with GCA is strongly associated with future risk of neurologic deficits. It may be difficult to separate atherosclerotic lesions from vasculitic lesions related to GCA, however, the presence of localized focal stenosis with relatively healthy arteries above and below the lesions may point to a vasculitic process. Rigorous attention should be given to modification of atherosclerotic risk factors as well as recognizing and treating the rare manifestation of GCA.

#### **49. Lower ultrasonographic cut-off point of optic nerve sheath diameter for raised intracranial cerebral pressure in Chinese Population**

lijuan wang<sup>1</sup>, yingqi xing<sup>1</sup>, yan yao<sup>2</sup>, wenhua lin<sup>3</sup>, jiachun feng<sup>1</sup>

<sup>1</sup>Department of neurology, First Hospital of Jilin University changchun, China, <sup>2</sup>Department of Epidemiology and Biostatistics, School of Public Health, Jilin University changchun, China, <sup>3</sup>Department of medicine and therapeutics, Prince of Wales Hospital hongkong, China

**BACKGROUND & PURPOSE:** Ultrasonography of optic nerve sheath may help identify raised intracranial pressure (ICP). As reported, an ONSD (optic nerve sheath diameter) above 5 mm on ultrasound was indicated for raised ICP in Caucasian population. However, ONSD cut-off for raised ICP in Chinese patients has not been established .We aim to identify the optimal ONSD for ICP > 20 mmHg in Chinese.

**METHODS:** This is a prospective observational study enrolling patients who were suspected raised ICP and performed lumbar puncture to verify ICP. ICP > 20 mmHg was considered as abnormally high. We excluded patients with ophthalmic diseases. ONSD was carried out before lumbar puncture. ONSD was measured bilaterally 3 mm behind the globe using a 9 MHz linear probe on the closed eyelids of supine patients. The average of two ONSD measurements was calculated. We analysed clinical differences between abnormal and normal ICP groups. An ROC curve was constructed to determine the optimal ONSD cut-off point for abnormal ICP.

**RESULTS:** Totally 234 patients were recruited. Eighty-two patients had raised ICP (152 normal ICP). Multivariate analysis showed ONSD was the only independent predictor for raised ICP. ROC curve analysis revealed area under the curve = 0.949 (95% CI 0.917-0.981). Optimal ONSD cut-off point for detection of ICP > 20 mmHg was  $\geq 3.775$  mm with sensitivity of 90.2% and specificity of 96.1%.

**CONCLUSIONS:** The ONSD criterion for raised ICP in Chinese patients is remarkably less than Caucasian. It suggests that ethnic differences should be noted and applied corresponding ultrasonographic criteria when ONSD was used to diagnose raised ICP.

#### **50. Pediatric Nasopharyngeal Carcinoma: Imaging, Pathological and Clinical Evaluation**

Alfred Weber<sup>1</sup>, Mary Beth Cunnane<sup>2</sup>, Amy Juliano<sup>3</sup>, M Larvie<sup>4</sup>, Hugh Curtin<sup>5</sup>

<sup>1</sup>Radiology MEEI Boston, MA, USA, <sup>2</sup>Radiology MEEI Boston, MA, USA, <sup>3</sup>Radiology MEEI Boston, MA, USA,

<sup>4</sup>Radiology MGH Boston, MA, USA, <sup>5</sup>Radiology MEEI Boston, MA, USA

**BACKGROUND & PURPOSE:** The purpose of this exhibit is to evaluate the clinical, pathological and imaging findings of nasopharyngeal carcinoma (NPC) in children and adolescents and compare the findings and differences with adult nasopharyngeal carcinoma

**METHODS:** We retrieved cases from the files of Mass Eye and Ear Infirmary, Mass General Hospital and King Faisal Specialist Hospital in Riyadh, Saudi Arabia over a period of 12 years. A total of 65 cases-up to the age of 20 years were

analysed with CT, MRI and in a few cases PET-CT

**RESULTS:** Carcinoma in children and adolescents manifested as a bulky large mass in the nasopharynx and in no cases as an infiltrative flat lesion. Frequently the extension occurred to the oropharynx, oral cavity/paranasal sinuses, orbital cavity and parapharyngeal space. Bony erosion in the skull base, principally clivus, was demonstrated in 50% of cases.

Lymphnode metastases to the neck were found in 90% of cases commonly manifesting as the initially finding. Noteworthy was the complete clearing of the bulky tumor masses in the nasopharynx and neck following radiation therapy in conjunction with multiagent chemotherapy. PET scanning was superior to CT and MRI in detecting recurrences and /or residual tumor in the neck and nasopharynx. The histopathology in all cases was undifferentiated carcinoma

**CONCLUSIONS:** Carcinoma of the nasopharynx should be considered in children especially when older than 10 years of age and when presenting with a large nasopharyngeal or a neck mass. Bone destruction in the base of skull is highly suggestive of NPC. CT and MRI are the imaging modalities for assessment of the location and extent of the lesion while PET-CT is useful for evaluating recurrence and regional and distant metastases. Undifferentiated carcinoma is the most common histopathological type. NPC responds optimally to radiation therapy in conjunction with chemotherapy with recurrent tumor and distant metastases

### 51. A case report on primary CNS vasculitis

Xin Xin Yu <sup>1</sup>, Cynthia Bamford<sup>2</sup>

<sup>1</sup>Department of Neurology Cleveland, OH, USA, <sup>2</sup>Neurological Center for Pain Cleveland, OH, USA

**BACKGROUND & PURPOSE:** Primary CNS vasculitis is a rare inflammatory condition that affects the CNS vessels without systemic involvement. It can be mimicked by a number of disorders due to its variable clinical presentations and nonspecific radiographic findings. Brain tissue biopsy remains the gold standard for the diagnosis.

**METHODS:** Case report

**RESULTS:** A 55 year-old woman was admitted with 1-year fluctuating symptoms of headache, right side weakness and numbness, blurry vision and dysarthria. Her initial MRI showed a mass lesion in the left parietal lobe with Gad enhancement and vasogenic edema. Metabolic, infectious and autoimmune testing including repeat CSF studies was negative. Brain biopsy showed focal acute and chronic inflammation with associated necrosis. Cerebral angiogram did not find evidence of vasculitis. PET was negative for malignancy. Given the stability of her symptoms, she was monitored with serial MRIs. One month later, she presented with worsening of symptoms, her repeat MRI showed mild progression of signal abnormality including the nodular enhancement. Repeat brain biopsy showed focal angiocentric chronic inflammation with necrosis and vascular sclerosis consistent with non-necrotizing vasculitis. In the absence of evidence of systemic autoimmune disease, malignancy, and infection, she was treated with prednisone 60mg once daily for primary CNS vasculitis with clinical improvement at 3-months follow up.

**CONCLUSIONS:** Primary CNS vasculitis is a difficult diagnosis to make and can be missed easily by clinicians due to its clinical heterogeneity and lack of validated diagnostic criteria. Our case report adds to the existing literature on the variable clinical presentations, radiographic manifestation that can be seen in primary CNS vasculitis.

