Table of Contents

PLATFORM SESSION I THURSDAY, NOVEMBER 21ST, 2019 11:00 AM – 12:00 PM	.7
Mobile Stroke Unit CTA and Direct Notification of Interventional Team Shortens Door-to-Puncture-Time by One	7
TOUR	ر. و
Machine Learning Identification of Large Vessel Occlusion (LVO) on Non-contrast Computed Tomography (NCCT).	10
IMPACT OF TIME AND ASPECTS ON CLINICAL CORE MISMATCH IN LARGE VESSEL OCCLUSION STROKES	11
PATIENT SELECTION FOR THROMBECTOMY WITH CT VERSUS CT PERFUSION IN THE EARLY TIME-WINDOW: A META-ANALYSIS	12
FIRST PASS EFFECT IN THE ANTERIOR AND POSTERIOR CIRCULATION: INSIGHTS FROM THE TREVO REGISTRY	14
PLATFORM SESSION II FRIDAY, NOVEMBER 22ND, 2019 11:00 AM – 12:00 PM	15
Acute subdural hematomas secondary to aneurysmal subarachnoid hemorrhage confer poor prognosis- a national perspective	15
Surpass™ Flow Diverter Trial Treating Large OR Giant Wide Neck Aneurysms: Posterior Communicating Artery Aneurysm	16
Cyclical Aspiration has an Improved Safety Profile Compared to Continuous Uniform Aspiration: In-Vivo Randomize Study	:D 17
THE CLINICAL IMPACT OF ELOQUENT CORTEX-TISSUE REPERFUSION BEYOND THE TRADITIONAL TICI SCORING AFTER THROMBECTOMY	18
E-ASPECTS CT ISCHEMIC VOLUME PERFORMS SIMILARLY TO CTP IN THE PREDICTION OF POST-REPERFUSION INFARCT VOLUME2	20
MECHANICAL THROMBECTOMY WITH PENUMBRA 3D REVASCULARIZATION DEVICE FOR ACUTE STROKE: INTERIM ANALYSIS OF	
	21
E-POSTER PRESENTATIONS THURSDAY, NOVEMBER 21, 2019 10:15 AM – 11:00 AM	22
A Phase III Trial to Assess Tenecteplase in Imaging-Eligible, Late-Window Patients With Acute Ischemic Stroke	22
RELATION BETWEEN BRAIN NATREURETIC PEPTIDE AND DELAYED CEREBRAL ISCHEMIA IN PATIENTS WITH ANEURYSMAL SUBARACHNOID	24
ATLAS [™] STENT ASSISTED ANTERIOR CIRCULATION ANEURYSM COILING: ONE YEAR OUTCOMES	25
EFFECTIVENESS AND SAFETY PROFILE OF THE COMANECI DEVICE IN THE TREATMENT OF WIDE-NECKED INTRACRANIAL ANEURYSMS. 2	26
E-POSTER PRESENTATIONS THURSDAY, NOVEMBER 21, 2019 3:30 PM – 4:00 PM	27
SAFETY AND EFFICACY OF THE PENUMBRA SYSTEM	27
MULTICENTER EXPERIENCE OF ADAPT WITH A NEW GENERATION LARGE BORE CATHETER FOR ACUTE STROKE THROMBECTOMY2	28
EFFECT OF GENERAL ANESTHESIA VERSUS CONSCIOUS SEDATION ON SUCCESSFUL REPERFUSION FOR DIFFERENT TARGET OCCLUSION	29
IMPACT OF ADMISSION TIME ON REVASCULARIZATION AND CLINICAL OUTCOMES IN ARISE II	30
FIRST PASS EFFECT RATES AND OUTCOMES WITH THE SOFIA PLUS CATHETER: A SINGLE CENTER EXPERIENCE	31
IMPACT OF TIME TO TREATMENT AND IMAGING MODALITY ON EARLY AND LATE WIDOW THROMBECTOMY OUTCOMES	32
E-POSTER PRESENTATIONS FRIDAY, NOVEMBER 22, 2019 3:30 PM – 4:00 PM	34
LARGER BORE CATHETER SIZE DOES NOT ENHANCE REPERFUSION WITH THE COMBINATION THROMBECTOMY TECHNIQUE.	34
IMPACT OF PROCEDURAL TECHNIQUES ON CLINICAL OUTCOMES IN TREATING LVOS WITH ENDOVASCULAR THERAPY ASSIST REGISTR	.Y 25
Rescue Stenting in Failed Thrombectomy: Back to the future? A Multi-Center Experience & Systemic Review	37
MECHANICAL THROMBECTOMY AS PART OF THE ARMENIAN STROKE INITIATIVE: A REVOLUTION OF NATIONAL HEALTHCARE	38
E-POSTER PRESENTATIONS SATURDAY, NOVEMBER 23, 2019 10:45 AM – 11:15 AM	39
Hyperdense Vessel Sign Modifies the Treatment Response to Stent Retriever versus Contact Aspiration	39

ENDOVASCULAR THERAPY VS N	Aedical Management for Emergent Medium Vessel Occlusion Strokes in Anterior	
CIRCULATION		40
RECURRENT THROMBECTOMY I	IN PATIENTS WITH PRIOR MECHANICAL ENDOVASCULAR REVASCULARIZATION: MULTICENTER	42
BASELINE CHARACTERISTICS OF	Symptomatic Carotid Webs: A Case Control Study.	
		лл
CENTRAL ADDITIACTS. FILM		
RARE CASE OF RAPIDLY RECURR	LENT BASILAR ARTERY THROMBOSIS TREATED WITH EMERGENT MECHANICAL THROMBECTOMIES AN	٧D
STENTING	· · · · · · · · · · · · · · · · · · ·	44
	ASES PRESENTING AS STROKE MIMICS	45
ENDOVASCULAR MANAGEMEN	IT OF AZYGOS ANTERIOR CEREBRAL ARTERY STROKE: A CASE REPORT	
	DUS CAROTID ARTERY DISSECTION WITH CONCOMITANT EAGLE SYNDROME AND RAEDER SYNDRO	JME.47
A RARE DIAGNOSIS MADE BASE		48
A CASE OF MICA STROKE WITH	I VARIABLE DEGREE OF HYPERDENSE ARTERY SIGN IN CITISCAN	49
	USION DEFICIT WITH MECHANICAL THROMBECTOMY: A CASE REPORT	50
	E RELATED TO A PERSISTENT PRIMITIVE I RIGEMINAL ARTERY	51
PIPELINE WITHIN PIPELINE APP	PROACH FOR PERSISTENT ENLARGING ANEURYSM AND FAILED INITIAL INTERVENTION: A CASE RE	PORT52
	WITH ZERO NIHSS AND A DISTAL INTERNAL CAROTID ARTERY OCCLUSION: CASE REPORTS	53
COMPOSITION OF RETRIEVED I	HROMBI IN ACUTE STROKE FROM CAROTID WEB	54
ECMO CAUSING FALSELY POSIT		55
ENDOVASCULAR REVASCULARIZ	ZATION OF CHRONIC TOTAL OCCLUSION OF THE INTERNAL CAROTID ARTERY: A CASE REPORT	50
		5/ 50
SUBOCCIPITAL CISTERNA MAG	NA INTRATHECAL INJECTION FOR SPINAL MUSCULAR ATROPHY (SIVIA)	58
RUPTURED SUPERIOR THYROID	ARTERY PSEUDOANEURYSM TREATED SUCCESSFULLY WITH ONYX 18 (LES)	59
MYCOTIC ANEURYSM FORMAT	ION IN A PATIENT WITH GRANULOMATOSIS WITH POLYANGITIS AND ALZHEIMER'S DISEASE	60
RESEARCH ABSTRACTS: PRIN	MARY CATEGORY – EMERGING THERAPIES	61
A-NOVEL APPROACH OF DETECT A CANINE STROKE-MODEL	TING CST-RECOVERY USING DTI-ANALYSIS, AFTER IA/MESENCHYMAL STEM/CELL INFUSI	ON IN 61
CLINICAL ABSTRACTS: PRIMA	ARY CATEGORY – EMERGING THERAPIES	62
LONG TERM OUTCOMES OF TR	RANSVERSE VENOUS SINUS STENTING FOR REFRACTORY DIOPATHIC INTRACRANIAL HYPERTENSION	N 62
SAFETY OF MIDDLE MENINGEA	ALARTERY EMBOLIZATION WITH EMBOSPHERES (100-300 µm)	
MIDDLE MENINGEAL ARTERY F	EMBOLIZATION TECHNIQUE LISING 100-300 MM EMBOSPHERES	64
RADIOGRAPHIC FINDINGS AFTE	R MIDDLE MENINGEAL ARTERY EMBOLIZATION	65
	FALARTERY EMBOLIZATION FOR CHRONIC SUBDURAL HEMATOMA	66
SAFETY AND FEELCACY OF INTRA	AVENOUS CANGRELOR AS ANTIPLATELET PREMEDICATION FOR ACUTE NEUROENDOVASCULAR	
PROCEDURES		67
CLINICAL ABSTRACTS: PRIMA	ARY CATEGORY - IMAGING	68
Referrat Center Vascular II	MAGING IMPROVES THE RATE OF THROMBECTOMY	68
ASYMPTOMATIC DOLICHOFCTA	ASIA OF BILATERAL ANTERIOR CEREBRAL ARTERIES.	
TRANSCRANIAL DOPPLER CO2	REACTIVITY: THRESHOLD FOR CLINICAL SIGNIFICANCE IN PATIENTS WITH VASCUL AR RISK FACTOR	ks 70
IMPROVED EFFICIENCY WITH R	ADIAL ACCESS FOR DIAGNOSTIC CEREBRAL ANGIOGRAPHY AT A COMPREHENSIVE STROKE CENTE	ER71
PREVALENCE OF CLASSIC RENAL	L AND CRANIOCERVICAL ARTERY FIBROMUSCULAR DYSPLASIA IN PATIENTS WITH CAROTID WEB	72
CLINICAL ABSTRACTS: PRIM	ARY CATEGORY – INTRACRANIAL ANEURYSM	73
		70
		د / / ح
	SEVE TO BOTTIN ANALIZING ANEUTODING TOST TIFLEINE γ COLLING AND CLIFFING.	

Validation of Surgical Theatre [®] in Evaluating Aneurysms After Pipeline™ Flow Diversion	75
HEAT GRADING SCALE AS A NEUROVASCULAR REMODELING BASED SCORE IN ANEURYSMS TREATED WITH FLOW DIVERSION	N76
VALIDATION OF SURGICAL THEATRE® IN EVALUATING ANEURYSMS AFTER CLIPPING	77
PRIMARY WIND DIAMETER OF NEUROVASCULAR EMBOLIC COILS INFLUENCES PACKING DENSITY AND CASE COSTS	78
TRENDS IN REAL-WORLD OUTCOMES ASSOCIATED WITH THE USE OF ENTERPRISE STENT FOR UNRUPTURED INTRACRANIAL	
Aneurysms	79
PIPELINE EMBOLIZATION IN THE TREATMENT OF POSTERIOR CIRCULATION ANEURYSM: A META-ANALYSIS	80
CLINICAL ABSTRACTS: PRIMARY CATEGORY – INTERACRANIAL HEMORRHAGE	81
ATRIAL FIBRILLATION, DEMENTIA, AND THEIR RELATIONSHIP IN THE INTRACEREBRAL HEMORRHAGE POPULATION	81
CLINICAL ABSTRACTS: PRIMARY CATEGORY – INTERACRANIAL STENOSIS	82
CANNABIS USE AND INTRACRANIAL STENOSIS: CASE REPORT AND LITERATURE REVIEW	82
CLINICAL ABSTRACTS: PRIMARY CATEGORY – ISCHEMIC STROKE	
LARGE VESSEL OCCLUSION DETECTION WITH NOVEL EEG-BASED DEVICE	83
Outcomes in Direct versus Transfer in Korean patients with acute ischemic stroke and mechanical thrombed	стому84
ENDOVASCULAR THERAPY OF DISTAL MCA- M3 OCCLUSIONS: A SINGLE-CENTER EXPERIENCE	85
EFFECT OF CHOLESTEROL REDUCERS ON PREDICTING CLINICAL RISK FACTORS FOR NIHSS SCORES IN ISCHEMIC STROKE	
Predicting Functional Ambulation in Patients with a TIA within 24 Hours Preceding an Ischemic Stroke	87
RETAINED MICROWIRE	
FUNCTIONAL OUTCOME FOLLOWING THROMBOLYSIS THERAPY IN ISCHEMIC STROKE PATIENTS WITH PRE-STROKE DEPRESSI	on89
DELAYS IN DOOR TO GROIN PUNCTURE IN ACUTE STROKE MECHANICAL THROMBECTOMY - UCLA EXPERIENCE	90
NATIONAL TRENDS IN UTILIZATION AND OUTCOMES OF MECHANICAL THROMBECTOMY IN ACUTE ISCHEMIC STROKE	91
A NOVEL, COMPREHENSIVE META-ANALYTIC SOFTWARE FOR STROKE THERAPIES	92
IS TRANS – RADIAL ACCESS SAFER THAN TRANS-FEMORAL ACCESS FOR ACUTE STROKE INTERVENTIONS?	93
IS THERE INCREASED INCIDENCE OF SUBARACHNOID HEMORRHAGE WITH USE OF STENTRIEVERS IN DISTAL CIRCULATION?	94
CHALLENGING THE CONVENTIONAL WISDOM: DO POSTERIOR CIRCULATION LARGE VESSEL OCCLUSIONS REALLY REQUIRE STE	NTRIEVERS
OR ASPIRATION?	95
Does Faster Femoral access for acute stroke interventions compromise patient safety?	96
"Bare Metal Versus First Generation Versus Second Generation Stents In Treatment Of Vertebral Artery S	tenosis"97
CLOSING THE GAP: SITE VERSUS CENTRAL CORE ASSESSMENT OF RECANALIZATION IN THE ARISE 2 STUDY	98
SHORT-TERM BLOOD PRESSURE VARIABILITY POST RE-CANALIZATION IS ASSOCIATED WITH DISCHARGE OUTCOMES IN LARGE	E VESSEL
STROKES	
IN PATIENTS WITH EARLY NEUROLOGICAL IMPROVEMENT, VESSEL LATERALITY IS NOT ASSOCIATED WITH LONG TERM OUT	COME 100
INCREASING DETECTION OF PAROXYSMAL ATRIAL FIBRILLATION WITH PROLONGED MIONITORING USING ASSF SCORE	101
THE RELATIONSHIP BETWEEN INTRA-PROCEDURAL CONTRAST EXTRAVASATION AND INTRACEREBRAL HEMORRHAGE FOLLOW	VING 102
MECHANICAL THROMBECTOMY: A CASE SERIES	102
ASSOCIATION OF EDUCATIONAL LEVEL WITH DELAY IN PRESENTATION AND UTILIZATION OF ACUTE ISCHEMIC STROKE THERE	VIES105
2016	104
Ενιδουάρει μαρ Μανιασεμεντ σε Δεί μτε Ιschemic Stroke σμε το Common Carolid Artery Occulision – Case Seri	104
DESCADEN ADSTRACTS, DDINAADY CATECODY ISCHEMIC STROKE DOE TO COMMON CAROTID ARTER'I OCCLOSION - CASE SENI	106
	100
CKITERIA FUK TISSUE PLASMINUGEN ACTIVATUR IN PATIENTS WITH PRE-STROKE DEPRESSION IN TELESTROKE SETTINGS	10b
THROWBOLYSIS THERAPY IN PATIENTS WITH DEPRESSION: IMPACT ON STROKE SEVERITY	107
OTILIZATION OF IV-TEA AND ENDUVASCULAR THERAPT IN ACUTE ISCHEMIC STRUKE PREGNANT POPULATION	
THERAPY	100

There is No Difference In Safety/Efficacy with Tirofiban/Eptifibatide for Patients treated with Tandem Lesions	110
GENDER DIFFERENCE IN PRE-STROKE DEPRESSIVE PATIENTS: EVALUATION OF FUNCTIONAL OUTCOMES	111
Emergent Use of Ticagrelor in Neuro-Endovascular Interventions: Efficacy and Safety	112
HIGH CORRELATION BETWEEN MULTIPHASE COLLATERAL SCORES AND CT PERFUSION PARAMETERS IN LARGE VESSEL OCCLUSIO	N
Strokes	113
MULTIPHASE VERSUS SINGLE-PHASE CT ANGIOGRAPHY FOR THE CHARACTERIZATION OF COLLATERAL FLOW IN LVO STROKE	114
FIRST PASS REPERFUSION VERSUS NON-FIRST PASS BUT COMPLETE REPERFUSION IN ACUTE STROKE THROMBECTOMY	115
VASCULAR IMAGING MISDIAGNOSIS IN PATIENTS WITH SYMPTOMATIC CAROTID WEB	116
CLINICAL ABSTRACTS: PRIMARY CATEGORY – SUBARACHNOID HEMORRHAGE	117
ENDOVASCULAR TREATMENT OF RAPTURED TINY CEREBRAL ANEURYSMS, FEASIBILITY AND COST EFFECTIVENESS IN LOW INCOME COUNTRY	117
RESEARCH ABSTRACTS: PRIMARY CATEGORY – SYSTEMS OF STROKE CARE	118
STROKE SYSTEMS OF CARE AND DIFFERENT MEASURES TO IMPROVE STROKE PATIENT CARE	118
IN-HOSPITAL STROKES TRANSFERRED TO A COMPREHENSIVE STROKE CENTER FOR MECHANICAL THROMBECTOMY	119
STROKE CENTER DESIGNATION, CERTIFYING ORGANIZATIONS AND PATENT OUTCOMES IN THE UNITED STATES	120
CLINICAL ABSTRACTS: PRIMARY CATEGORY – VASOSPASM	121
MECHANICAL THROMBECTOMY FOR ACUTE ISCHEMIC STROKE IN COCAINE USERS	121
CLINICAL ABSTRACTS—E-POSTER ONLY: PRIMARY CATEGORY – CASE REPORTS	122
Embolic Protection Using Balloon Catheters For Subclavian Artery Revascularization With Dual Transfemora	L AND
Transradial Access	122
FIRST SUCCESSFUL EXTRACRANIAL-INTRACRANIAL BYPASS IN PATIENT ON TICAGRELOR AND ASPIRIN	123
Mixed Dural Arteriovenous Fistula and Arteriovenous Malformation Presenting as Trigeminal Neuralgia	124
SUPRATENTORIAL AND INFRATENTORIAL STROKES IN THE SETTING OF A PERSISTENT PRIMITIVE TRIGEMINAL ARTERY	125
A YOUNG PATIENT WITH SPONTANEOUS DISSECTION OF BILATERAL INTERNAL CAROTID AND VERTEBRAL ARTERIES.	126
BILATERAL MEDIAL MEDULLARY INFARCTION IN A PATIENT WITH BASILAR ARTERY FENESTRATION – CAUSE OR COINCIDENCE?	127
DEFORMATION OF A WEB DEVICE FOLLOWING DEPLOYMENT IN AN ANTERIOR COMMUNICATING ARTERY ANEURYSM	128
TIME LAST ELECTRICALLY WELL : NEUROPHYSIOLOGICAL MONITORING FOR IDENTIFICATION OF INTRA-OPERATIVE LARGE VESSEL	
OCCLUSION FORMATION	129
SIMULTANEOUS ONSET OF SUBARACHNOID HEMORRHAGE AND CONTRALATERAL ISCHEMIC STROKE DUE TO INFECTIVE ENDOCA	RDITIS
	130
FLOW-DIVERTING STENT PLACEMENT IN A PEDIATRIC PATIENT THROUGH RADIAL ARTERY APPROACH	131
OCULAR STEAL AN UNUSUAL PRESENTATION OF SPONTANEOUS CAROTID DISSECTION	132
Use of IV cangrelor for cesarean section after emergent intracranial stenting for large vessel occlusion	133
UTILIZATION OF TCD EDS IN ASSESSMENT OF ANTIPLATELET FUNCTION IN CAROTID ARTERY ANGIOPLASTY AND STENTING	134
MASSIVE ALVEOLAR HEMORRHAGE AFTER THE USE OF TIROFIBAN- A RARE COMPLICATION	135
CLINICAL ABSTRACTS—E-POSTER ONLY: PRIMARY CATEGORY – CERVICAL STENOSIS	137
IMAGING OUTCOMES IN PATIENTS WITH CERVICOCEREBRAL ARTERY DISSECTION	137
METHODS OF CAROTID REVASCULARIZATION IN AIS: SAFETY AND EFFICACY IN A SINGLE CENTER COHORT	138
SAFETY AND EFFICACY OF ACUTE EMERGENT CAROTID STENTING TREATMENT FOR SYMPTOMATIC CAROTID STENOSIS	139
SAFETY AND EFFICACY OF ACUTE CAROTID STENTING TREATMENT IN ACUTE SYMPTOMATIC PATIENTS	140
CLINICAL ABSTRACTS—E-POSTER ONLY: PRIMARY CATEGORY – EMERGING THERAPIES	141
TRANSCIRCULATION APPROACH IN ENDOVASCULAR NEUROSURGERY: A MULTICENTER STUDY	141
NBCA EMBOLIZATION OF THE MIDDLE MENINGEAL ARTERY FOR CHRONIC SUBDURAL HEMATOMAS: CONSECUTIVE CASE SERIES	143

SILK VISTA BABY (SVB) FLOW DIVERTING STENT FOR THE TREATMENT OF DISTAL COMPLEX INTRACRANIAL ANEURYSMS	144
SAFETY OF LOW-DOSE INTRAVENOUS CANGRELOR FOR ACUTE STENTING DURING NEUROINTERVENTIONAL TREATMENT: A SI CENTER CASE SERIES	NGLE- 145
CLINICAL ABSTRACTS—E-POSTER ONLY: PRIMARY CATEGORY – IMAGING	146
EFFICIENT MULTIMODAL MRI EVALUATION FOR ENDOVASCULAR THROMBECTOMY OF ANTERIOR CIRCULATION LARGE VESSE	EL 14C
	140
COST EFFECTIVENESS OF TRANS-RADIAL APPROACH FOR CEREBRAL ANGIOGRAPHY	147
ASSOCIATION OF PRE-IVIECHANICAL THROMBECTOMY COLLATERAL SCORES WITH INFARCT VOLUMES ON COMPUTED-TOMO	GRAPHY-
OUANTITATIVE COMPARISON OF MULTIDETECTOR CT AND CONE-BEAM CT DERELSION IN STROKE DATIENTS LINDERCOINC	140
MECHANICAL THROMBECTOMY	149
CLINICAL ABSTRACTS—E-POSTER ONLY: PRIMARY CATEGORY – INTERESTING CASES	150
THE RETROGRADE APPROACH TO TRANSVERSE-SIGMOID SINUS STENTING	151
INTRAPROCEDURAL HYPERTENSION AND BLOOD PRESSURE VARIABILITY ARE ASSOCIATED WITH CONTRAST INDUCED NEUROT	OXICITY
AFTER NEUROINTERVENTIONAL PROCEDURES	152
RECANALIZATION OF OPHTHALMIC ARTERY OCCLUSION FOLLOWING FLOW DIVERSION: CASE REPORT AND LITERATURE REVIL	EW153
ELEVATED HBA1C IS NOT ASSOCIATED WITH POOR FUNCTIONAL OUTCOME IN STROKE PATIENTS POST ENDOVASCULAR TH	erapy 154
CLINICAL ABSTRACTS—E-POSTER ONLY: PRIMARY CATEGORY – INTRACRANIAL ANEURYSM	155
OFF-LABEL USE OF THE WEB DEVICE	155
FLOW DIVERTER PLACEMENT FOR A GIANT CAROTID TERMINUS ANEURYSM VIA OPEN CAROTID EXPOSURE	156
TRENDS AND OUTCOMES OF ENDOVASCULAR TECHNIQUES VERSUS CLIPPING OF UNRUPTURED INTRACRANIAL ANEURYSMS II	n ≥80
YEARS	157
CLIPPING VERSUS COILING OF RUPTURED INTRACRANIAL ANEURYSMS IN THE YOUNGER POPULATION: A META-ANALYSIS	158
Multi-center Comparison of Transradial Access for Flow-Diversion Treatment with Transfermoal Access: A	FEASIBLE
Alternative	159
RESEARCH ABSTRACTS—E-POSTER ONLY: PRIMARY CATEGORY – INTRACRANIAL ANEURYSM	160
MANAGEMENT OF MIDDLE CEREBRAL ARTERY ANEURYSMS: A SINGLE CENTER EXPERIENCE	163
CLINICAL ABSTRACTS—E-POSTER ONLY: PRIMARY CATEGORY – ISCHEMIC STROKE	164
Intensive Care Unit Complications and Outcomes in Mechanical Thrombectomy for Acute Ischemic Stroke	164
THE CHARACTERISTICS OF PATIENTS WHO UNDERWENT DECOMPRESSIVE CRANIECTOMY DUE TO ACUTE ISCHEMIC STROKE	166
ENDOVASCULAR MANAGEMENT OF ACLITE LARGE VESSEL OCCULISION STROKE IN PREGNANCY IS SAFE AND FEASIBLE	100
MECHANICAL THROMBECTOMY IN THE OLDEST OF THE OLD. A PROPENSITY SCORE-MATCHED ANALYSIS	168
CONF-REAM CTA BY IV-CONTRAST IS RELIABLE TO EVALUATE PATIENTS WITH I VO	169
EXPERIENCE WITH AUTONOMOUS TCD ROBOTIC SYSTEM FOR PEO DETECTION IN EMBOLIC STROKE OF	
UNDETERMINED SOURCE	
SAFETY OF CANGRELOR IN EMERGENCY ENDOVASCULAR STROKE RECANALIZATION, A SINGLE CENTER EXPERIENCE	
DISABLING STROKE IN THE ALREADY DISABLED: ETHICAL DIMENSIONS AND DIRECTIVES.	
EVALUATION AND MANAGEMENT OF CHRONIC ISCHEMIC PENUMBRA	
Acute kidney injury after endovascular treatment in acute ischemic stroke patients	176
OUTCOMES OF ENDOVASCULAR THERAPY AFTER INTERHOSPITAL TRANSFER FOR ANTERIOR CIRCULATION STROKE	177
QUANTIFICATION OF PERFUSION DEFECT USING NATIONAL INSTITUTES OF HEALTH STROKE SCALE (NIHSS) SCORE	178
UTILITY OF TPA ADMINISTRATION IN ACUTE TREATMENT OF CAROTID ARTERY OCCLUSIONS	180
RADIOLOGICAL FEATURES ASSOCIATED WITH UNSUCCESSFUL RECANALIZATION AFTER MECHANICAL THROMBECTOMY IN LAR	ge Vessel
Occlusions	

SINGLE CENTER EXPERIENCE FOR SOLITAIRE AND TREVO STENTS IN ENDOVASCULAR TREATMENT OF ACUTE ISCHEMIC STROKE	182
RATES OF ENDOVASCULAR THROMBECTOMY UTILIZATION IN A TRANSFER COHORT WITHIN A TELE-STROKE NETWORK	183
TROPONIN ELEVATION IN MECHANICAL THROMBECTOMY PATIENTS WITH ACUTE STROKE IS NOT ASSOCIATED WITH WORSE	
OUTCOMES	184
FACTORS ASSOCIATED WITH PROLONGED HOSPITALIZATION IN STROKE PATIENTS AFTER ENDOVASCULAR TREATMENT	186
IRON DEFICIENCY ANEMIA AND PEDUNCULATED CAROTID ARTERY THROMBUS	187
ESEARCH ABSTRACTS—E-POSTER ONLY: PRIMARY CATEGORY – ISCHEMIC STROKE	188
UTILIZATION OF IV-RTPA AND ENDOVASCULAR THERAPY USE ON OFF-HOURS VS. ON-HOURS: AN AGE GROUP COMPARISON	189
ASSOCIATION OF CHOLESTEROL LEVELS IN A FEMALE ACUTE ISCHEMIC STROKE POPULATION	190
PREDICTING IMPROVEMENT IN ISCHEMIC STROKE PATIENTS WITH PREVIOUS TRANSIENT ISCHEMIC ATTACK >24 HOURS OF ONSET .	191
GENDER AND PREVIOUS TIA IN ACUTE ISCHEMIC STROKE POPULATION	192
PILOT STUDY DISCRIMINATING BETWEEN LVO AND DISTAL OCCLUSION BASED ON TCD WAVEFORM ANALYSIS	193
INTRA-ARTERIAL THROMBOLYSIS AFTER FAILED MECHANICAL THROMBECTOMY: A STRATIS REGISTRY SUBGROUP ANALYSIS	194
INSIGHTS INTO INTRA-ARTERIAL THROMBOLYSIS IN THE MODERN ERA OF MECHANICAL THROMBECTOMY	195
IMPACT OF DIRECT ANGIOSUITE TRIAGE IN STROKE CARE OF TRANSFERRED PATIENTS FOR ENDOVASCULAR THROMBECTOMY	196
INICAL ABSTRACTS—E-POSTER ONLY: PRIMARY CATEGORY – SYSTEMS OF STROKE CARE	197
INTERHOSPITAL TRANSFER FOR ENDOVASCULAR STROKE THERAPY IS ASSOCIATED WITH WORSE OUTCOMES	197
THE GREAT TRIAGE DEBATE: FINDING THE PERFECT LVO TOOL	198
REAL TIME SMART DATA COLLECTION AND ANALYSIS USING THE EPIC EMR SYSTEM AT ERLANGER HOSPITAL	199

E-Poster 156

Mobile Stroke Unit CTA and Direct Notification of Interventional Team Shortens Door-to-Puncture-Time by One Hour

<u>Alexandra L Czap, MD¹</u>, Noopur Singh, MPH¹, Ritvij Bowry, MD¹, Amanda Jagolino-Cole, MD¹, Stephanie A Parker, RN², Patti Bratina, RN², Nicole Guitierrez, RN², Kenny Phan, BS², Mengxi Wang, PhD¹, Sunil A Sheth, MD¹, Suja S Rajan, PhD¹, Jose-Miguel Yamal, PhD¹, James C Grotta, MD²

¹The University of Texas Health Science Center at Houston, Houston, Texas, USA; ²Memorial Hermann Hospital, Houston, Texas, USA

Introduction:

Endovascular thrombectomy (ET) is an effective but time-sensitive treatment of acute ischemic stroke. Time from Emergency Department arrival to start of ET (door-to-puncture-time, DTPT) is a modifiable metric. One time-consuming step in prolonging DTPT is identification of large vessel occlusion (LVO) by CT angiography (CTA). BEST-MSU is a prospective multi-center comparative effectiveness study of tPAeligible patients managed on mobile stroke unit (MSU) vs Emergency Medical Services. After discovering that DTPT was >60 minutes in both groups at three BEST-MSU centers in 2018, we began to routinely obtain CTA on MSU and directly alert ET team at receiving hospitals if LVO was identified. We hypothesized this would shorten DTPT by >30minutes.

Methods:

In this single-center experience, we compared median (interquartile range, IQR) DTPT and MSU onscene time for MSU patients having on-board-CTA then ET from 9/2018-9/2019 to corresponding MSU ET patients (excluding any having on-board-CTA) from 8/2014-8/2018. All CTAs were completed onscene after tPA bolus, during infusion on Ceretom 8-slice scanner with MSU stationary.

Results:

19 patients having CTA on-board the MSU then ET were compared to 84 patients in the pre-on-board-CTA group. Baseline characteristics including median NIHSS score (19 on-board-CTA vs 20 pre-on-board-CTA) and frequency of tPA (89% in both groups) were comparable. Median DTPT was >50minutes shorter with on-board-CTA and direct notification of the interventional team from the MSU; 44minutes (IQR 30-59.5) vs 94.5minutes (IQR 69.75-117.25) (p<0.001). Despite additional time to obtain CTA on MSU, on-scene time was only slightly prolonged and did not offset the reduction in DTPT (on-board-CTA 31minutes (IQR 28-34.5) vs pre-on-board-CTA 27minutes (IQR 23-31) (p=0.01). Though not significant, a shorter DTPT resulted in greater improvement of 24hour-NIHSS score for the entire cohort (p=0.07).

Conclusions:

Pre-hospital identification and notification of LVO by MSU allows a nearly one hour reduction of DTPT, and can be utilized to establish direct-to-angiosuite protocol.

Keywords: Door To Groin Puncture, Angiographic Ct, Endovascular Therapy, Ischemic Stroke

Financial Disclosures: The authors had no disclosures.

Grant Support: Benefits of Stroke Treatment Delivered Using a Mobile Stroke Unit Compared to Standard Management (BEST-MSU Study). A comparative effectiveness study of prehospital care

including tPA treatment using a Mobile Stroke Unit vs Standard Management by EMS. Patient Centered Outcomes Research Institute PCORI R-1511-33024. James C. Grotta, P.I. 40%, (\$7,784,030.00 direct) 10/01/2016-12/31/2022. -Industry Support (Drug): Genentech (tPA)

Stroke and LVO detection using AI from facial analysis: A Cross-center Study

<u>Marc Ribo, MD PhD</u>¹, Sona Ohanian, MD², Ludovico Ciolli, MD¹, Anna Reznik, MD², Laura Brancaleoni, MD¹, Chen Buxbaum, MD², Daniela Sanhueza, MD¹, Sofia Figueiredo, MD¹, Joao Serodio, MD¹, Rotem Sivan-Hoffmann, MD²

¹Hospital Vall d'Hebron, Barcelona, Spain; ²Neurology Dept, RAMBAM HEALTHCARE CAMPUS, Haifa, Israel

Introduction:

CVAid Flow (CVAid LTD. Tel-Aviv, Israel) is a novel remote, AI decision-support tool for stroke diagnosis and patient management for mobile devices. We aim to validate its ability to identify and grade stroke symptoms.

Methods:

88 stroke patients (SP) and 43 healthy controls (HC) from 2 different stroke centers participated in the study. Patient's face was recorded while performing neurologic examination using CVAid dedicated smartphone-based Application. CVAid and a certified neurologist determined the NIHSS Facial Palsy (FP: 0 to 3). The presence of LVO was determined according to CTA. The software processed the video file and determined: 1- FP score, 2- stroke diagnosis Vs healthy, and 3-likelihhod of LVO+ based on comprehensive automated AI analysis of facial features

Results:

From the 131 enrolled subjects 88 (67%) had a stroke and 50 (38%) an LVO+. CVAid identified 82 patients as stroke patients with an accuracy of 93% and within the stroke group 40 patients as LVO+ with an accuracy of 80%. CVAid Facial analysis algorithm can distinguish between different level of Facial Paresis (FP). The agreement between Neurologist and CVAid algorithm is 89% for Healthy controls, 87% for patients diagnosed with facial paresis 0 (FP0), 85% for FP1, and 87% for FP2 + FP3.

Conclusions:

Our results show that CVAid's smart phone based data acquisition system and AI-based data analysis solution are able to detect subtle neurophysiological signs that, in turn, can act as an objectively measurable biomarkers for (i) determining Facial Palsy severity, (ii) diagnose stroke symptoms and (lii) predict LVO.

Keywords: Stroke

Financial Disclosures: Scientific Advisor of CVAid

Machine Learning Identification of Large Vessel Occlusion (LVO) on Non-contrast Computed Tomography (NCCT)

<u>Marc Ribó, MD PhD</u>¹, Carlos Crespo, MSc², Cristina Granes, MSc², Maria Hernández-Pérez, MD PhD³, Natalia Pérez de la Ossa, MD PhD³, Carlos Laredo, MSc⁴, Xabier Urra, MD PhD⁴, Juan Carlos Soler, MD⁴, Alexandre Soler, MD⁴, Paloma Puyalto, MD PhD³, Patricia Cuadras, MD PhD³, Cristian Martí, MBA, BSc²

¹Hospital Vall d'Hebron, Barcelona, Spain; ²Methinks Software, Barcelona, Spain; ³Hospital Germans Trias i Pujol, Barcelona, Spain; ⁴Hospital Clinic, Barcelona, Spain

Introduction:

Validation of an algorithm identifying LVO on NCCT.

Methods:

Patients with suspected acute stroke who underwent NCCT+CT Angiography (CTA) from two comprehensive stroke centers were included. Patients with intracranial haemorrhage were excluded. Two experienced radiologists identified the presence of LVO on CTA (NR-CTA) tagging the clot location and manually segmenting the clot. Acute ischemia and clot signs on NCCT were also depicted with assistance of the CTA clot location. With this information a deep learning system was used to create an algorithm (Deepstroke) to identify and locate the presence/absence of acute ischaemia and clot signs in NCCT. Deepstroke image output was used to train a binary classifier to determine LVO on NCCT. Cross-validation was performed in a stratified 5-fold of the data, including deep learning training. We also studied the effect on Deepstroke accuracy when adding the patients NIHSS and time from onset to the model (Deepstroke+).

Results:

The data cohort included 1354 patients, 724 (53%) with LVO by NR-CTA. The accuracy of Deepstroke to identify LVO had an AUC of 0.81 (sensitivity 0.85; specificity 0.49, PPV 0.66, NPV 0.74), and improved combined with NIHSS and time from symptom onset to AUC 0.88 (sensitivity 0.87, specificity 0.68, PPV 0.76, NPV 0.82). Deepstroke performed better on larger occlusions. Among patients identified as LVO by Deepstroke+ only 19% showed no findings on NR-CTA. The agreement in LVO detection between NR-CTA and Deepstroke+ was 0.78 (Deepstroke was 0.68). Process time per patient was below 120s.

Conclusions:

In patients with suspected acute stroke, Deepstroke identified LVO in NCCT with a high correlation with radiologist readings of CTAs. Deepstroke could reduce the need to perform CTA, generate alarms and increase the efficiency of patients transfers in the acute management in stroke networks. Deepstroke accuracy will improve as more cases are added to the training set.

Keywords: Diagnostic Neuroradiology, Mechanical Thrombectomy, Acute Stroke, New Innovation, Acute Ischemic Stroke Intervention

Financial Disclosures: The authors had no disclosures.

Impact of Time and ASPECTS on Clinical Core Mismatch in Large Vessel Occlusion Strokes

<u>Shashvat M Desai, MD¹</u>, Bradley J Molyneaux, MD¹, Marcelo Rocha, MD PhD¹, Matthew Starr, MD¹, Tudor G Jovin, MD², Ashutosh P Jadhav, MD PhD¹

¹University of Pittsburgh, Pittsburgh, Pennsylvania, USA; ²Cooper University, Camden, New Jersey, USA

Introduction:

Patient selection for endovascular thrombectomy (EVT) for anterior circulation large vessel occlusion (LVO) strokes in the 6-24-hour time window is dependent on delineating clinical core mismatch (CCM) as defined by DAWN trial criteria. In contrast, patient selection in the early window (0-6 hours) can be performed using ASPECTS on CT head. We aim to determine the prevalence of DAWN-CCM in LVO strokes and the impact of time and ASPECTS.

Methods:

Retrospective analysis of large vessel occlusion [internal carotid and middle cerebral artery-M1] strokes at a CSC. Consecutive patients who underwent CT perfusion or MRI within 120 minutes of CT head were included in the study (treated and untreated). Ischemic core volume was assessed using RAPID [IschemaView] and ASPECTS using automated ASPECTS [Brainomix]. CCM was defined using DAWN trial criteria [DAWN-CCM: NIHSS ≥10 and core <31 ml, NIHSS ≥20 and core <51 ml].

Results:

A total of 116 patients were included. Mean age was 71 ±14 and 62% were females. Mean ischemic core volume and median ASPECTS were 46 ±65 ml and 8 (6-9), respectively. In patients with NIHSS score \geq 10 (98), 57% had DAWN-CCM in the 0-24-hour window. Proportion of patients with DAWN-CCM in 6-24-hour window was 70% (6-12 hours), 50% (12-18 hours), and 50% (18-24 hours) [p=0.35]. Proportion of patients with DAWN-CCM by ASPECTS group was 88% (ASPECTS 9-10), 64% (ASPECTS 6-8) and 13% (ASPECTS 0-5) [p=<0.01] (Figure 1). Probability of DAWN-CCM declines by 7% for every 2 hours increase in TLKW to imaging, and by 13% for every 1-point decrease in ASPECTS.

Conclusions:

Approximately 57% of LVO strokes have clinical core mismatch. LVO strokes with DAWN-CCM decline with increasing time and decreasing ASPECTS. ASPECTS alone may be sufficient to identify patients with DAWN-CCM in resource limited setting and avoid time consuming advanced imaging.

Keywords: Acute Stroke, Ct Perfusion, Imaging

Financial Disclosures: The authors had no disclosures.

Patient Selection for Thrombectomy with CT Versus CT Perfusion in the Early Time-Window: A Metaanalysis

<u>Ashutosh P Jadhav, MD PhD</u>¹, Mayank Goyal, MD², Bruce C Campbell, MD³, Charles Majoie, MD⁴, Diederik W Dippel, MD⁵, Phil White, MD⁶, Serge Bracard, MD⁷, Francis Guillemin, MD⁷, Antoni Davalos, MD⁸, Michael D Hill, MD², Andrew M Demchuk, MD², Scott Brown, PhD⁹, Jeffrey L Saver, MD¹⁰, Keith W Muir, MD¹¹, Peter Mitchell, MD¹², Tudor G Jovin, MD¹³

¹University of Pittsburgh, Pittsburgh, Pennsylvania, USA; ²University of Calgary, Calgary, Canada; ³University of Melbourne, Melbourne, Australia; ⁴Academisch Medisch Centrum Universiteit, Amsterdam, Netherlands; ⁵Erasmus MC, Rotterdam, Netherlands; ⁶Newcastle University, Newcastle, United Kingdom of Great Britain and Northern Ireland; ⁷University of Lorraine, Nancy, France; ⁸Hospital Universitari Germans Trias i Pujol, Barcelona, Spain; ⁹Stryker, Stryker, USA; ¹⁰University of California Los Angeles, Los Angeles, , USA; ¹¹University of Glasgow, Glasgow, United Kingdom of Great Britain and Northern Ireland; ¹²The Royal Melbourne Hospital, Melbourne, Australia; ¹³Cooper University, Camden, USA

Introduction:

The optimal imaging paradigm for a neurothrombectomy selection criteria in acute ischemic stroke patients presenting with anterior circulation large vessel occlusion in the early time window remains uncertain. We aimed to investigate the association between a simplified (no pre-treatment perfusion study acquired) versus advanced imaging (pre-treatment perfusion study acquired) approach and safety and efficacy of neurothrombectomy.

Methods:

In this meta-analysis of individual patient-level data, HERMES collaboration analyzed randomized controlled trials comparing endovascular therapy (EVT) with standard medical therapy for acute ischemic stroke in setting of proximal anterior circulation large vessel occlusion. The primary endpoint was neurological functional disability scored on the modified Rankin Scale (mRS) score at 90 days. Safety outcomes included symptomatic intracranial hemorrhage (sICH), parenchymal hematoma type-2 within 5 days of randomization, and mortality within 90 days.

Results:

We analyzed individual data for 1336 patients. CT perfusion (CTP) was acquired in 603 patients and CT perfusion was not acquired in 733 patients. Median time last seen well to scan time was 132 minutes (CTP) vs 127 minutes (no CTP) and median scan time to groin puncture time was 79 minutes in both groups. Rates of 90-day mRS 0-2 and sICH in the thrombectomy arm were not statistically different between patients with perfusion imaging versus those without. The benefit of thrombectomy compared to best medical therapy was maintained in both imaging paradigms (rates of 90-day mRS 0-2 in patients allocated to thrombectomy vs control: with perfusion: 46% vs 29%, without perfusion: 45% vs 28%). In univariate and multivariable analyses, the acquisition of pre-treatment perfusion imaging was not identified as a significant predictor of mRS 0-2 at 90 days.

Conclusions:

There was no difference observed in treatment effect between patients who were imaged with or without CT perfusion. CTP may not be required for patient selection for thrombectomy within 6 hours of onset.

Keywords: Imaging, Ischemic Stroke, Endovascular Therapy

Financial Disclosures: The authors had no disclosures.

First pass effect in the anterior and posterior circulation: insights from the TREVO registry <u>Ashutosh P Jadhav, MD PhD</u>¹, David S Liebeskind, MD², Shashvat M Desai, MD¹, Ronald Budzik, MD³, Rishi Gupta, MD⁴, Joey English, MD⁵, Antonin Krajina, MD⁶, Bruno Bartolini, MD⁷, Blaise Baxter, MD⁸, Raul G Nogueira, MD⁹, Erol Veznedaroglu, MD¹⁰

¹University of Pittsburgh, Pittsburgh, Pennsylvania, USA; ²University of California Los Angeles, Los Angeles, USA; ³Riverside Methodist Hospital/Ohio Health Research Institute, Columbus, Ohio, USA; ⁴Wellstar Health System, Atlanta, USA; ⁵California Pacific Medical Center, San francisco, USA; ⁶Charles University Hospital, Hradec Kralove, USA; ⁷Lausanne University Hospital, Lausanne, Switzerland; ⁸Erlanger, Chattanooga, USA; ⁹Emory University, Atlanta, USA; ¹⁰Drexel University, Philadelphia, USA

Introduction:

Achieving complete revascularization (TICI3) after single pass of neurothrombectomy device (true first pass effect-FPE) in the setting of an acute ischemic stroke due to large vessel occlusion is associated with significantly higher rates of a good clinical outcome. We aim to characterize clinical features and outcomes in patients who achieved FPE in the TREVO registry.

Methods:

Data were analyzed from the TREVO registry. ICA, M1, and M2 lesions were considered for the anterior circulation analysis. A total of 1,326 patients were analyzed. Univariate and multivariate analyses were performed to assess the relationship of clinical and procedural characteristics with FPE. Similar analysis was performed for basilar artery occlusions.

Results:

For the anterior circulation, FPE was achieved in 539 (40.7%) patients. FPE was not significantly related to lesion location or device size. Mean time last seen well to groin puncture was significantly shorter for FPE (5.0 versus 5.8 hrs, p=.0007). The rate of 90-day mRS 0-2 was significantly higher (60.4% versus 54.0%, p=.02). Both 90-day mortality (10.6% versus 13.2%) and symptomatic intracranial haemorrhage (sICH) within 48 hours (0.9% versus 2.2%) lower in the FPE group, but not significant. Non-ICA occlusion and use of balloon guide catheter were not associated with FPE. Amongst the 78 patients with basilar artery occlusions (BGC), 31 subjects achieved FPE. The rate of 90-day mRS 0-2 was numerically higher (61.3% versus 44.7%, p=ns). Both 90-day mortality (16.1% versus 25.5%) and sICH within 48 hours (0% versus 4.3%) were lower in the FPE group, but not significant.

Conclusions:

Higher likelihood of achieving FPE leads to better outcomes in patients undergoing neurothrombectomy in the anterior circulation. Shorter symptoms onset to groin puncture was associated with FPE but use of BGC of non-ICA site of occlusion were not. In the posterior circulation, there was trends towards better outcomes in the patients who achieved FPE.

Keywords: Acute Ischemic Stroke Intervention, Acute Stroke, Endovascular Therapy, Ischemic Stroke

Financial Disclosures: The authors had no disclosures.

Acute subdural hematomas secondary to aneurysmal subarachnoid hemorrhage confer poor prognosis- a national perspective.

<u>Gurmeen Kaur, MD</u>¹, Katarina Dakay, DO¹, Jared Cooper, MD¹, Nitesh Damodara, MD¹, Justin Santarelli, MD¹, Chirag Gandhi, MD¹, Fawaz Al-Mufti, MD¹

¹Westchester Medical Center, Valhalla, New York, USA

Introduction:

Aneurysmal ruptures cause subarachnoid bleeding with intraparenchymal and intraventricular extension. There are rare instances of acute aneurysmal ruptures presenting with concomitant, non-traumatic subdural hemorrhage. We explored the difference in outcomes of subdural hematoma (SDH) in the setting of aneurysmal subarachnoid hemorrhage (aSAH) as compared to aSAH alone.

Methods:

This retrospective cohort study from 2012-2015 from the National Inpatient Sample (NIS, 20% stratified sample of all hospitals in the United States). The NIS database (2012 to September 2015) was queried to identify all patients presenting with aSAH. All patients with traumatic SAH were excluded. To assure that SAH patients are aneurysmal, only those that also had ICD code of cerebral aneurysms were included. From this population, the patients with concomitant SDH were identified.

Results:

A total of 10,075 patients with both cerebral aneurysms and subarachnoid hemorrhage (aSAH) were included. Of these, 335 cases of concomitant SDH and aSAH were identified. In the group with aSAH and SDH, mean age was 60.6 ±1.55 years with a male: female ratio 1:2.3. Nearly 55% of this population was white, 42.4% Medicare users, and 58.8 had high APDRG mortality scores. 60% of this population had preexisting hypertension and 17% had neurological ailments. There was no significant change in the rate of SDH in aSAH over time. SDH with aSAH patients had a mortality of 24% compared to 12% in the SAH only group, and only 16% were discharged home versus 37% in the SAH group.

Conclusions:

There is a 3.5% incidence of acute SDH in patients presenting with non-traumatic aSAH. Patients with SDH and aSAH have nearly double the mortality, higher rate of discharge to nursing home and rehab and a significantly lower rate of discharge to home and return to routine functioning. This information is useful in counseling and prognostication of patients with concomitant SDH and aSAH.

Keywords: SDH

Financial Disclosures: The authors had no disclosures.

Surpass™ Flow Diverter Trial Treating Large OR Giant Wide Neck Aneurysms: Posterior Communicating Artery Aneurysm

<u>Peter Kan, MD, MPH, FRCSC, FAANS</u>¹, Alexander L Coon, MD², Ricardo A Hanel, MD, PhD³, Philip M Meyers, MD⁴, Ajay K Wakhloo, MD⁵

¹Baylor College of Medicine, Houston, Texas, USA; ²Carondelet Neurological Institute of St. Joseph's and St. Mary's Hospitals, Tucson, Arizona, USA; ³Lyerly Neurosurgery, Jacksonville, Florida, USA; ⁴Columbia University, New York, New York, USA; ⁵NeuroInterventional Radiology Tufts University Medical School, Burlington, Massachusetts, USA

Introduction:

Surpass[™] Flow Diverter was developed to treat large or giant wide-neck intracranial aneurysms (IA) not amenable to surgical or current standard endovascular treatment due to location, morphology, or known treatment challenges. The Indications for use allow for placement in the ICA to the terminus including the posterior communicating artery segment (PCOM).

Methods:

SCENT Trial is an international, multi-center, prospective, non-randomized trial comparing the outcomes of Surpass[™] Flow Diverter treatment to historic control. It is designed to evaluate the safety and efficacy of Surpass[™] in the treatment of wide-neck (≥4mm) large or giant IA ≥10 mm in size. The primary safety endpoint is the percent of subjects experiencing neurologic death or major ipsilateral stroke at 12 months. The primary effectiveness endpoint is the percent of subjects with 100% occlusion (Raymond Class 1) without clinically significant stenosis (≤50% stenosis) of the parent artery, and any retreatment of the target aneurysm at 12-month. We evaluated the safety and effectiveness of flow diversion in the prespecified subgroup of PCOM aneurysms.

Results:

Of the 180 subjects treated, 38 (21.1%) patients harbored a PCOM aneurysm. Subjects with PCOM aneurysms had a mean age of 63.0 years and 89.5% (34/38) were females. The mean parent vessel diameter proximal to the aneurysm neck was 3.8 mm. Mean aneurysm dimensions were: dome height 10.2mm and neck width 4.8 mm. Technical success occurred in 100.0% (38/38) of subjects while the mean number of Surpass[™] devices used was 1.2 per procedure, with 84.2% (32/38) of aneurysms treated with a single flow diverter. Of the 38 subjects with PCOM aneurysms, the 12-month primary effectiveness rate was 65.8% [95% CI [(48.6, 80.4)] and the 12-month major ipsilateral stroke or neurological death rate was 10.5% [95% CI 2.9, 24.8].

Conclusions:

SCENT demonstrated 12-month safety and effectiveness of flow diversion in large or giant wide-neck PCOM aneurysms.

Keywords: Flow Diverter

Financial Disclosures: Research Grant; Modest; NCI/SPORE, Stryker. Ownership Interest; Modest; InNeuroco. Consultant Advisory Board; Modest; Stryker, Medtronic

Cyclical Aspiration has an Improved Safety Profile Compared to Continuous Uniform Aspiration: In-Vivo Randomized Study

Ram Kadirvel, PhD¹, Yong-Hong Ding, MD¹, Daying Dai, MD¹, Waleed Brinjikji, MD¹, David Kallmes, MD¹

¹Mayo Clinic, Rochester, Minnesota, USA

Introduction:

There is growing evidence that cyclical aspiration is more effective than continuous uniform (aka static) aspiration for clot removal (1, 2). In a large animal model that includes vessel diameters comparable to human neurovascular vessels, we tested the hypothesis that cyclical (aka pulsatile or intermittent) aspiration results in an improved safety profile compared to continuous uniform aspiration.

Methods:

Institutional Animal Care and Use Committee (IACUC) approval was obtained. Six New Zealand white rabbits were used. Angiography was performed at days 0, 30, 90 to assess for vasospasm or narrowing, thrombosis, emboli, and vessel injury. After sacrifice on day 90, a blinded histopathologist evaluated the vessels including endothelial or vessel injury.

Results:

Cyclical aspiration (29inHg/18inHg 0.5Hz) was performed using CLEAR System (Group 1 - Insera, n=13 vessels). Continuous uniform aspiration (29inHg) was performed using Penumbra System (Group 2 - Penumbra, n=12) and CLEAR System (Group 3 - Insera, n=12). Three passes in each vessel was performed. Commercially available catheters were used: 0.032"-0.041" (Penumbra), 0.055" (Microvention), 0.088" (Penumbra) based on target vessel diameters. Target vessels included common and superficial femoral arteries (~M1 & M2), common iliac artery and aorta (~vertebro-basilar & carotid), and were randomized to each group. Persistent vasospasm (in M1/M2 equivalents) on day 0 was noted in 56% of Group 2 & 3 (Continuous aspiration, n=16) compared to 12.5% in Group 1 (Cyclical aspiration, n=8), p=0.046. Mild narrowing (<25%) persisted on day 30 in 1 vessel of Group 2. No adverse events persisted on angiography or histopathology at day 90 (all groups).

Conclusions:

Cyclical aspiration has an improved safety profile at the time of procedure and has a substantially equivalent safety profile to continuous uniform aspiration at 90 days. Minimizing persistent vasospasm at the time of stroke thrombectomy procedure in the setting of cerebral ischemia has clinical implications.

Keywords: Acute Ischemic Stroke Intervention

Financial Disclosures: Research grants: NIH Research contract: Neurogami Medical, Insera Therapeutics

The clinical impact of eloquent cortex-tissue reperfusion beyond the traditional TICI scoring after thrombectomy

<u>Radoslav Raychev, MD</u>¹, Jeffrey Saver, MD¹, Scott Brown, PhD², Gary Duckwiler, MD¹, Reza Jahan, MD¹, Satoshi Tateshima, MD, MsC¹, Viktor Szeder, MD, PhD¹, May Nour, MD, PhD¹, Geoffrey Colby, MD¹, Lucas Restrepo, MD, PhD¹, Doojin Kim, MD¹, Mersedeh Bahr Hosseini, MD¹, Jason Hinman, MD, Phd¹, Latsha Sharma, MD¹, Sidney Starkman, MD¹, David Liebeskind, MD¹

¹UCLA, Los Angeles, California, USA; ²Bright Research Partners, Minneapolis, Minnesota, USA

Introduction:

Targeted eloquence-based reperfusion within the primary motor cortex may have differential effect on disability as compared to the traditional volume-based (TICI) reperfusion after endovascular thrombectomy (EVT) in setting of acute ischemic stroke (AIS).

Methods:

We explored the impact of eloquent reperfusion (ER) within primary motor cortex (PMC) on clinical outcome (mRS) in AIS patients undergoing EVT. ER was defined as presence of flow on final post-EVT digital subtraction angiography (DSA) within four main cortical branches, potentially supplying the PMC (MCA – precentral, central, anterior parietal; ACA- pericallosal) and defined as absent (0), partial (1), and complete (2). Prospectively collected data from two centers were analyzed. Multivariable analysis including baseline ASPECTS, NIHSS, Age, and sICH was conducted to assess the impact of ER on 90 days disability (mRS) among patients with anterior circulation occlusion who achieved partial reperfusion (TICI 2 a and b) post EVT.

Results:

Among the 353 screened patients who received EVT, 125 with TICI 2 (a or b) were included in the analysis. Median age was 73, median NIHSS was 16, median ASPECTS was 7, and 48% (60/125) were female. 37% (46/125) of the analyzed patients achieved functional independence (mRS 0-2) at 90 days. ER distribution was: a) 0 in 19/125 (15.2%), b) 1 in 53/125 (42.4%), and c) 53/125 (42.4%). TICI 2B was achieved in 101/125 (80%) and ER was substantially higher in those patients (p<0.001). Among all analyzed variables, including Age, NIHSS, ASPECTS, sICH, TICI (2a vs 2b), ER had the most profound impact on 90 days disability (OR 6.1, p=0.001 for ER 1 vs 0; and OR 9.87, p<0.001 for ER 2 vs 0).

Table 1				
Characteristic	ER O	ER1	ER2	P value
TICI 2a	47.4% (9/19)	21.2% (11/52)	5.6% (3/54)	<0.001
TICI 2b	52.6% (10/19)	78.8% (41/52)	94.4% (51/54	
	Multivariate an	alysis for predictors	of 90 days disability	,
Predictor	Odds Ratio	LCL	UCL	P value
Age (years)	0.97	0.95	0.99	0.003
NIHSS	0.89	0.84	0.94	<0.001
ASPECTS	1.05	0.90	1.22	0.571
SICH	0.05	0.01	0.32	0.001
TICI 2b (vs 2a)	0.95	0.38	2.33	0.903
ER 1 (vs 0)	6.10	2.13	17.42	0.001
ER 2 (vs 0)	9.87	3.19	30.58	<0.001

Fig1. 90 days mRS distribution according to Eloquent Reperfusion grade



Conclusions:

Our findings support that targeted eloquence-based reperfusion is more impactful than volume-based reperfusion. Further EVT attempts, aimed to revascularize the eloquent primary motor cortex, may be necessary even in patients achieving TICI 2B.

Keywords: Mechanical Thrombectomy, Revascularization, Recanalization, TICI

Financial Disclosures: The authors had no disclosures.

E-ASPECTS CT Ischemic Volume Performs Similarly to CTP in the Prediction of Post-Reperfusion Infarct Volume

<u>Mehdi Bouslama, MD</u>¹, Krishanan Ravindran, MD², George Harston, DPhil, MA, MBBChir, MRCP³, Gabriel Rodrigues, MD², Leonardo Pisani, MD², Diogo Haussen, MD², Michael Frankel, MD², Raul Nogueira, MD²

¹Emory University SOM, Atlanta, USA; ²Emory University/Grady Memorial Hospital, Atlanta, USA; ³Oxford University Hospitals, Oxford, United Kingdom of Great Britain and Northern Ireland

Introduction:

The e-ASPECTS software (Brainomix, Oxford, UK) is a tool designed for the automated quantification of ASPECTS and ischemic core volumes on Non-Contrast CT (NCCT). We sought to compare the prediction of post-reperfusion infarct volumes and the clinical outcomes across NCCT e-ASPECTS versus RAPID (IschemaView, Menlo Park, CA) CT perfusion measurements.

Methods:

All consecutive patients with anterior circulation LVOS presenting at a tertiary care center between 9/2010-11/2018 who had available baseline infarct volumes on both NCCT e-ASPECTS and RAPID CTP as well as final infarct volume (FIV) measurements and achieved complete reperfusion (mTICI 2c-3) post-thrombectomy were included. The correlations between estimated baseline ischemic core volumes and FIV as well as 90-day functional outcomes were assessed.

Results:

479 patients met inclusion criteria. Median age was 67[59-76], median e-ASPECTS and CTP ischemic core volumes were 31.4cc[17.2-49.6] and 2.7cc[0-13] respectively whereas median FIV was 22.5cc[9-54.6]. The correlation between e-ASPECTS and CTP ischemic core volumes was moderate (R=0.44, p<0.001). Similarly, moderate correlations were observed between e-ASPECTS ischemic core and FIV (R=0.52, p<0.001) and CTP core and FIV(R=0.43,p<0.001). Outliers elimination using a Cook's distance approach yielded similar correlation results (R=0.53,p<0.001 for e-ASPECTS and FIV; R=0.42,p<0.001 for CTP and FIV). After Adjusting for time from last-known-normal to Picture, e-ASPECTS ischemic core volume and CTP core volume independently predicted post-reperfusion FIV (Beta 0.98;95%CI[0.72-1.2],p<0.0001 and Beta 1.17;95%CI[0.88-1.45],p<0.0001respectively). Subgroup analysis showed that e-ASPECTS and CTP performance was similar in the early and late treatment (>6 hours) windows. Multivariate analysis showed that both e-ASPECTS ischemic core volume (adjusted OR 0.983;95%CI[0.972-0.994,p=0.002] and CTP core volume(adjusted OR 0.985;95%CI[0.973-0.997],p=0.015) were independently and comparably associated with 90-day good outcome (mRS 0-2).

Conclusions:

NCCT e-ASPECTS software performed similarly to RAPID CTP in predicting post-reperfusion FIV and functional outcomes for both early- and late-presenting patients. NCCT e-ASPECTS volumes

Keywords: Acute Stroke, Aspects, Ct Perfusion

Financial Disclosures: The authors had no disclosures.

E-Poster 157

Mechanical Thrombectomy With Penumbra 3D Revascularization Device For Acute Stroke: Interim Analysis Of COMPLETE Registry

Johanna T Fifi, MD¹, Ameer E Hassan, DO², Osama O Zaidat, MD³

¹Icahn School of Medicine at Mount Sinai, New York, New York, USA; ²University of Texas Rio Grande Valley, Valley Baptist Medical Center, Harlingen, Texas, USA; ³Mercy Health St. Vincent Medical Center, Toledo, Ohio, USA

Introduction:

The purpose of this interim analysis is to report safety and efficacy of 3D Revascularization Device (3D) for mechanical thrombectomy in patients with acute ischemic stroke due to large vessel occlusions (LVO).

Methods:

COMPLETE is a prospective, single-arm, international, multi-center observational registry that includes patients with intracranial LVO who had planned frontline thrombectomy with the Penumbra System. Subjects with any ASPECT Score were eligible. 3D, a component of the Penumbra System, is a selfexpanding retrievable device that captures clot and facilitates removal under direct aspiration. Successful revascularization (mTICl≥2b), time to revascularization, device and procedure related complications, good functional outcome (mRS 0-2) at 90 days, and all-cause mortality at 90 days were evaluated in patients treated with 3D.

Results:

This interim subset analysis included 238 patients (mean age 68.0±14.1; 52.1% female). Mean baseline NIHSS was 14.8±7.1. Median time from onset to puncture was 299.0 (IQR 194.0-500.5) minutes. Median time from puncture to reperfusion was 31 (IQR 20.0-50.0) minutes. 3D with aspiration was used frontline in 83% (197/238) and as rescue in 17% (41/238) of cases. Overall, successful revascularization (mTICl≥2b) was achieved in 90.8% of cases. Successful revascularization was 90.9% for frontline 3D and 90.2% for rescue 3D cases. First pass successful revascularization with 3D was achieved in 58.7%. Rates of procedure- and device-related SAE within 24 hours were 6.9% (16/233) and 3.4% (8/233), respectively. Symptomatic ICH occurred in 3.9% (9/233) and vessel perforation in 0.4% (1/233) of cases. All-cause mortality at 90 days was 26.0% (38/146), and good functional outcome at 90 days was achieved in 46.6% (68/146) of cases. Enrollment for the COMPLETE registry is ongoing.

Conclusions:

Mechanical thrombectomy with the 3D Revascularization Device under direct aspiration appears to be safe and effective, resulting in high rates of successful revascularization.

Keywords: Acute Ischemic Stroke Intervention, Seperator 3d, Penumbra, Mechanical Thrombectomy

Financial Disclosures: Research grants from Stryker, Penumbra, and Microvention. Consultant for Stryker and Microvention. Ownership interest in Imperative Care

Grant Support: Penumbra

E-Poster 158

A Phase III Trial to Assess Tenecteplase in Imaging-Eligible, Late-Window Patients With Acute Ischemic Stroke

<u>Gregory W Albers, MD¹</u>, Joseph Broderick, MD², Ken Butcher, MD, PhD, FRCP³, Bruce C. V Campbell, MD, FACEM, FACEP, FAAEM⁴, Michael T Froehler, MD⁵, Maarten G Lansberg, MD, PhD⁶, David S Liebeskind, MD⁷, Amre M Nouh, MD⁸, Lee H Schwamm, MD⁹, Florence Toy, PhD¹⁰, Linda Yau, PhD¹⁰, Ming Yang, PhD¹⁰, Megan Schoeffler, PharmD¹⁰, Barbara Purdon, PhD¹⁰

¹Stanford University Medical Center, Stanford, California, USA; ²UC Gardner Neuroscience Institute, Cincinatti, Ohio, USA; ³University of Alberta, Edmonton, Canada; ⁴Melbourne Brain Centre at the Royal Melbourne Hospital, Parkville, Australia; ⁵Vanderbilt Cerebrovascular Program, Nashville, Tennessee, USA; ⁶Neurosciences Institute, Stanford University, Palo Alto, California, USA; ⁷Neurovascular Imaging Research Core and UCLA Stroke Center, Los Angeles, California, USA; ⁸Hartford Hospital, Hartford, Connecticut, USA; ⁹Massachusetts General Hospital, Boston, Massachusetts, USA; ¹⁰Genentech, Inc., South San Francisco, California, USA

Introduction:

Systemic thrombolysis with alteplase, a human tissue plasminogen activator (tPA), is standard of care for eligible patients within 4.5 h of acute ischemic stroke (AIS). For select patients with AIS due to large vessel occlusion (LVO) who show a salvageable brain pattern on advanced imaging, mechanical thrombectomy (MT) ≤24 h after AIS onset improves functional outcomes. Tenecteplase, a modified tPA, has shown potential for treating patients beyond the 4.5-h window and may achieve reperfusion before MT in some patients.

Methods:

This Phase III, prospective, double-blind, randomized, placebo-controlled trial (NCT03785678) will evaluate the efficacy and safety of tenecteplase vs placebo in patients with AIS (age \geq 18 y) presenting in the 4.5–24h time window, who have LVO (intracranial internal carotid or middle cerebral artery [M1 or M2]) and meet CT or MR perfusion mismatch imaging criteria with ischemic core <70 mL. Patients will be randomized 1:1 to tenecteplase (0.25 mg/kg; max, 25 mg) or placebo, administered as a single bolus injection. Patients will receive standard of care thrombectomy if indicated. Randomization will be stratified by age, site of occlusion, baseline National Institutes of Health Stroke Scale score and hospital site. The primary objective is to demonstrate the superiority of tenecteplase over placebo with standard of care, using ordinal analysis of the modified Rankin scale score at Day 90. Secondary endpoints include the proportion of patients where planned MT was not performed due to early reperfusion. Target enrollment is 456 patients.

Results:

The trial has been enrolling patients as of March 2019.

Conclusions:

This trial will determine if treatment with IV tenecteplase in patients with AIS who have LVO and salvageable brain tissue on imaging 4.5–24 h after onset results in improved clinical outcomes and increased early reperfusion that may reduce the need for endovascular therapy.

Keywords: Acute Ischemic Stroke Intervention

Financial Disclosures: GWA serves as a consultant for Genentech, iSchemaView and Medtronic and has equity in iSchemaView.

Grant Support: This study was funded by F. Hoffmann- La Roche Ltd./Genentech, Inc.

E-Poster 159

Relation between brain natreuretic peptide and delayed cerebral ischemia in patients with aneurysmal subarachnoid hemorrhage

<u>Gurmeen Kaur, MD¹</u>, Nitesh Damodara, MD¹, Raghav Gupta, MD², Justin Santarelli, MD¹, Chirag Gandhi, MD¹, Fawaz Al-Mufti, MD¹

¹Westchester Medical Center, Valhalla, New York, USA; ²Rutgers Medical Center, Newark, New York, USA

Introduction:

Immune regulation and inflammation is implicated in the development of delayed cerebral ischemia (DCI) in patients with aneurysmal subarachnoid hemorrhage (aSAH). BNP is implicated in fluid dysregulation and inflammation in critically-ill patients. We explored the association between BNP levels and development of DCI in patients with aSAH.

Methods:

Patients were enrolled from the Neurological Intensive Care Unit between 2006 and 2015 in the SAH Outcomes Project, a single center, prospective, observational cohort study. Demographic data, treatment and outcomes, and BNP levels at admission and through the hospital admission were noted.

Results:

In the 149 patients included in the analysis, 79 developed DCI during their hospital course. Significantly higher number of patients in the DCI group had external ventricular drain (EVD) placements (p=0.008). The DCI group also had significantly higher rates of rebleeding and hydrocephalus. In the logistic regression analysis between BNP levels and DCI, there is a significant association with admission BNP and DCI (OR-1.002, 95%CI 1.00-1.004, p=0.017), DCI and highest BNP (OR 1.001, 95%CI-1.001-1.002, p=0.002), and change in BNP with change in time (OR 1.006, 95%CI 1.002-1.01, p=0.002). The ROC curve analysis for DCI based on BNP showed that the highest BNP level during hospital admission (AUC 0.78) was a stronger predictor than the change in BNP over time (AUC 0.776) or the admission BNP (AUC 0.632).

Conclusions:

There is a significant association between the BNP level and the risk of developing DCI. This increased risk for DCI is associated not only with higher baseline BNP values (admission BNP) but also with the highest BNP level attained during the hospital course as well as the rapidity of change or increase in BNP over time. Hence, BNP values may help to identify SAH patients at high risk of cardiac morbidity and facilitate appropriate triaging.

Keywords: Aneurysm

Financial Disclosures: The authors had no disclosures.

E-Poster 160

Atlas[™] Stent Assisted Anterior Circulation Aneurysm Coiling: One Year Outcomes Brian T Jankowitz, MD¹, Osama O Zaidat, MD², Brian T Jankowitz, MD¹

¹Cooper University Hospital, Camden, New Jersey, USA; ²St. Vincent Medical Center, Toledo, Ohio, USA

Introduction:

Stent-assisted coil embolization using the Neuroform Atlas[™] Stent System has shown promising results. Here, we present the one-year real world angiographic efficacy and safety results of the anterior circulation cohort in the ATLAS Investigational Device Exemption (IDE) Trial.

Methods:

ATLAS IDE is a prospective, multicenter, single-arm, open label study of unruptured wide-necked (neck ≥4mm or dome-to-neck ratio <2) intracranial aneurysms in the anterior circulation treated with the Neuroform Atlas Stent and approved coils in the United States. Adjudication of the primary endpoints was performed by an imaging core laboratory and the ATLAS Clinical Events Committee.

Results:

182 patients at 25 medical centers were enrolled with unruptured wide-necked anterior circulation aneurysms. Mean aneurysm size was 6.1±2.2mm, mean neck width was 4.1±1.2mm, and mean dometo-neck ratio was 1.2±0.3. The most frequent aneurysm locations were the anterior communicating artery (64/182; 35.2%), ophthalmic internal carotid artery (29/182; 15.9%), and middle cerebral artery bifurcation (27/182; 14.8%). Stents were placed in the anticipated anatomic location in 100% of patients. Of the 151 (83.0%) patients with complete DSA follow-up at 12 months, 133 (88.1%) had complete aneurysm occlusion (Raymond class I) at 12 months. 27 (17.9%) patients progressed to better occlusion (Raymond–Roy class I or II), with 21 (13.9%) moving from 2 to 1, 5 (3.3%) from 3 to 1, and 1 (0.7%) from 3 to 2. Overall, 4.4% (8/182) of patients experienced a major ipsilateral stroke with persistent neurological deficit.

Conclusions:

In the ATLAS IDE anterior circulation cohort pre-market approval study, the Neuroform ATLAS stent with adjunctive coiling demonstrated high rates of long-term complete occlusion at 12 months, with excellent technical success and safety.

Keywords: Aneurysm, Aneurysm Embolization, Stent Assisted, Coiling

Financial Disclosures: stryker - consultant Medtronic - consultant

E-Poster 161

Effectiveness and Safety Profile Of The Comaneci Device In The Treatment Of Wide-necked Intracranial Aneurysms

<u>Mani Puthuran, MBBS, MRCS, FRCR</u>¹, Richard Pullicino, MD, MRCP, FRCR¹, Feyi Babatola, MBBS, MRCS, FRCR¹, Roshan K Babar, Medical Student², Arun Chandran, MBBS, MRCS, FRCR¹

¹The Walton Centre NHS Foundation Trust, Liverpool, United Kingdom of Great Britain and Northern Ireland; ²Liverpool University, Liverpool, United Kingdom of Great Britain and Northern Ireland

Introduction:

Wide-necked intracranial aneurysms can be challenging to treat especially if they have unfavourable geometries. These can be treated using balloon assisted coiling however this arrests flow within the target vessel. The Comaneci device is a compliant mesh which provides a temporary scaffolding in wide necked aneurysms without flow arrest. The aim of the study is to prospectively evaluate the efficacy and safety profile of the Comaneci device in the treatment of wide necked aneurysms.

Methods:

From January 2017 to January 2018, 42 patients with 43 intracranial wide-necked aneurysms (21 ruptured and 22 unruptured) consecutively underwent endovascular treatment using the Comaneci device and evaluated prospectively. These were followed up for 6 months with evaluation of clinical and imaging results. Imaging from 27 cases were evaluated by an independent core lab.

Results:

Complete occlusion (mRR I) was achieved in 32 (74.42%) cases and this was overall sustained at 6 months (74.4%). Thromboembolic complications was observed in 5 cases (11.63%) from which only one (2.33%) ended with permanent neurological sequale. There were no cases of intraprocedural aneurysm or vessel rupture.

Conclusions:

The Comaneci device is a useful adjunct in the treatment of intracranial aneurysms with an efficacy and safety profile comparable to that of balloon assisted coiling reported in the literature.

Keywords: Balloon Assisted, Aneurysm Embolization

Financial Disclosures: The authors had no disclosures.

E-Poster Presentations | Thursday, November 21, 2019 | 3:30 pm – 4:00 pm

E-Poster 162 Safety and Efficacy of the Penumbra system Johanna T Fifi, MD¹, Ameer E Hassan, DO², Osama O Zaidat, MD³

¹Icahn School of Medicine at Mount Sinai, New York, New York, USA; ²University of Texas Rio Grande Valley, Valley Baptist Medical Center, Harlingen, Texas, USA; ³Mercy Health St. Vincent Medical Center, Toledo, Ohio, USA

Introduction:

To report on the efficacy and safety of the Penumbra System in patients with acute ischemic stroke (AIS) secondary to intracranial large vessel occlusion (LVO) in the posterior circulation.

Methods:

COMPLETE is a prospective, international, multi-center registry of patients with intracranial LVO who are eligible for mechanical thrombectomy and have planned frontline treatment with the Penumbra System. In this interim analysis, we analyzed a subset of patients with LVO in the posterior circulation. Efficacy endpoints included post-procedural mTICI 2b-3, and 90-day mRS 0-2. Safety endpoints included 90-day all-cause mortality, device- and procedural-related serious adverse events (SAEs), and symptomatic intracranial hemorrhages (sICH) at 24 hours.

Results:

A total of 536 subjects (mean age 68.3 yrs±14.0; 53.3% female) were enrolled in the registry. Of these, 45 subjects (mean age 66.2 yrs±15.4; 45.5% female) were treated for a large vessel occlusion in the posterior circulation using frontline aspiration thrombectomy with the Penumbra System. Median PC-ASPECTS was 10.0 [IQR 9.0, 10.0]. Post-procedural mTICI 2b-3 was achieved in 97.7% (43/44) of subjects, and 35.7% (10/28) subjects achieved a 90-day mRS of 0-2. No device-related SAEs occurred within 24h, while the rate of procedure-related SAEs within 24h was 6.8% (3/44). Symptomatic ICH at 24h was 2.3%. No vessel perforations were reported; however, vessel dissection was reported in one case (2.3%). Enrollment is ongoing.

Conclusions:

The Penumbra System was able to achieve high reperfusion rates with acceptable safety outcomes in patients with AIS in the posterior circulation.

Keywords: Acute Ischemic Stroke Intervention, Clinical Trial, TICI, Endovascular Therapy, Mechanical Thrombectomy

Financial Disclosures: Research grants from Stryker, Penumbra, and Microvention. Consultant for Stryker and Microvention. Ownership interest in Imperative Care

E-Poster Presentation | Thursday, November 21, 2019 | 3:30 pm - 4:00 pm

E-Poster 162

Multicenter Experience of ADAPT with a New Generation Large Bore Catheter for Acute Stroke Thrombectomy

Ameer E Hassan, DO¹, Johanna T Fifi, MD², Osama O Zaidat, MD³

¹University of Texas Rio Grande Valley, Valley Baptist Medical Center, Harlingen, Texas, USA; ²Icahn School of Medicine at Mount Sinai, New York, New York, USA; ³Mercy Health St. Vincent Medical Center, Toledo, Ohio, USA

Introduction:

To report initial real-world experience of ADAPT with Penumbra JET 7 (JET7), a new generation larger bore reperfusion catheter, in patients with acute stroke due to large vessel occlusions (LVO).

Methods:

COMPLETE is an international, prospective, single-arm, multi-center observational registry, including patients with intracranial LVO and planned frontline treatment with the Penumbra System (PS). We performed an interim comparison between frontline JET7 ADAPT (ID 0.072", used primarily with the Penumbra ENGINE pump), and frontline other-PS devices. Outcomes include revascularization success (mTICl≥2b), time to revascularization, complication rates, and good functional outcome (mRS 0-2).

Results:

This subset analysis included 114 frontline JET7 ADAPT cases (mean age 67.8±13.8; 49.1% female) and 301 other-PS (primarily ACE68 [65.4%]) cases (mean age 68.8±14.0; 56.8% female). Median puncture-to-reperfusion time was 18.5 minutes with JET7 and 27.0 with other-PS. Successful first pass revascularization was 66.7% with JET7 and 60.7% with other-PS. Successful revascularization post-procedure was 96.5% with JET7 and 95.3% with other-PS. Device-related SAE within 24 hours occurred in 0% with JET7 and 1.3% with other-PS. Procedure-related SAE within 24 hours occurred in 2.6% with JET7 and 4.7% with other-PS. Occurrence of symptomatic ICH was 3.5% with JET7 and 4.0% with other-PS. Vessel perforation rate was 0.9% with JET7 and 0% with other-PS. No vessel dissection occurred with JET7 and 4 (1.3%) occurred with other-PS. Good functional outcome at 90 days was observed in 54.4% of JET7 cases and 53.5% of other-PS cases. Enrollment is ongoing.

Conclusions:

Aspiration thrombectomy with the new Penumbra JET 7 catheter and the ADAPT technique may allow for faster procedure times and higher rates of successful first pass revascularization compared to other PS catheters.

Keywords: Acute Ischemic Stroke Intervention, Clinical Trial, Penumbra, Revascularization, Acute Stroke

Financial Disclosures: Consultant and speaker for GE Healthcare, Medtronic, Stryker, MicroVention, Penumbra, and Genentech.

E-Poster Presentation | Thursday, November 21, 2019 | 3:30 pm - 4:00 pm

E-Poster 163

Effect of General Anesthesia Versus Conscious Sedation on Successful Reperfusion for Different Target Occlusion Locations

<u>Radoslav Raychev, MD¹</u>, David Liebeskind, MD¹, Albert Yoo, MD, PhD², Jeffrey Saver, MD¹, Mads Rasmussen, MD, PhD³, Claus Ziegler Simmonsen, MD, PhD³

¹UCLA, Los Angeles, USA; ²Texas Stroke Institute, Dallas, Texas, USA; ³Aarhus University Hospital, Aarhus, Denmark

Introduction:

Successful reperfusion during endovascular thrombectomy (EVT) for acute ischemic stroke (AIS) may affected by patient motion, especially in more difficult to access, technically challenging targets, such as tandem and distal occlusions. General anesthesia (GA) may be particularly beneficial as compared to conscious sedation (CS) in such patients.

Methods:

We evaluated target occlusion subtypes in the GOLIATH randomized trial comparing GA and CS. Patients were divided in 2 groups based on target arterial occlusion: 1) single, proximal occlusion (ICA T/M1), and 2) tandem or distal (M2) occlusion. Technical success was defined as substantial reperfusion (TICI 2B/3). Multivariable analysis adjusted for age, baseline NIHSS, baseline ischemic core volume, and IV TPA was conducted in each group to assess the impact on technical and clinical outcome. Interaction test for heterogeneity was conducted to assess the difference in outcomes across the subrgoups.

Results:

Among 128 analyzed patients, 80 (62.5%) had single, proximal occlusions and 48 (37.5%) had tandem (22.7%) or distal (14.8%). The absolute difference in substantial reperfusion was higher for both tandem occlusion (83.3% vs 36.4%) and distal occlusion (75% vs 57.1%) than for single, proximal occlusion (74.3% vs 66.7%). The combined distal and tandem occlusion group showed magnified reperfusion success with GA vs CS (80.0% vs 44.4%) compared with the single, proximal occlusion group, (p=0.048, interaction test for heterogeneity). The single and proximal occlusion group showed improved 3m functional independence with GA vs PS (p=0.030), although the heterogeneity between groups was not significant (proximal and single: 71.4% vs 44.4%; tandem or distal: 63.3% vs 72.2%, heterogeneity p=0.12). There was no heterogeneity in the effect of method of sedation on mortality across analyzed groups.

Conclusions:

Achievement of substantial reperfusion during endovascular thrombectomy may deferentially be aided by general anesthesia in patients with technically more challenging distal and tandem occlusions

Keywords: Acute Ischemic Stroke Intervention, Endovascular Therapy, General Anesthesia, TICI

Financial Disclosures: The authors had no disclosures.

E-Poster Presentation | Thursday, November 21, 2019 | 3:30 pm – 4:00 pm

E-Poster 164

Impact of Admission Time on Revascularization and Clinical Outcomes in ARISE II

<u>Marc Ribo, MD¹</u>, Tommy Andersson, MD², H Bozorgchami, MD³, Jeffrey L Saver, MD⁴, Jan Gralla, MD⁵, Steven Hajdu, MD⁶, Johannes Kaesmacher, MD⁵, Patrik Michel, MD⁶, Ossama O Zaidat, MD⁷

¹Hospital Vall d'Hebron, Barcelona, Spain; ²Karolinska Univ Hospital, Stockholm, Sweden; ³Oregon Health & Science University, Portland, Oregon, USA; ⁴UCLA, Los Angeles, USA; ⁵Inselspital/University Hospital, Bern, Switzerland; ⁶CHUV, Lausane, Switzerland; ⁷Mercy Health - St. Vincent Medical Center, Toledo, Ohio, USA

Introduction:

Patients admitted outside of regular working hours may have worse outcomes than patients admitted during standard office hours. We investigated this question for stroke in ARISE II (Analysis of Revascularization in Ischemic Stroke with EmboTrap).

Methods:

ARISE II was a single-arm, prospective, multicenter study to assess the effectiveness of the EmboTrap thrombectomy device. Complete dataset for this analysis was available for 214 of 227 patients. 97 patients were admitted to the hospital during regular work hours (8am-5pm) and 117 patients during non-office hours, weekends, or holidays

Results:

Mean age (66.1 vs 69.6 years, p=0.06) and stroke severity (NIHSS 16.1 vs 15.7, p = 0.45) were similar among the two groups. Time from admission to groin puncture was shorter during office hours (1 vs 1.2 hrs, p = 0.007). Revascularisation was similar in both groups: first pass mTICl 2c-3 was 38 vs 42% (p = 0.58) and mTICl 3 was 28 vs 32% (p = 0.55); after 3 passes, mTICl 2c-3 was 64 vs 60% (p = 0.58), mTICl 3 was 45 vs 44% (p = 0.80); final mTICl 2c-3 was 72 vs 79% (p = 0.27) and mTICl 3 was 52 vs 51% (p = 0.97). Clinical outcome assessed as mRS 0-1 was 50% vs 53% (p = 0.72) and mRS 0-2 was 65% vs 70% (p = 0.42). Preliminary comparison of ARISE II to real world data from 2 large stroke centers showed a similar rate of admission during the night shift (p=0.9).

Conclusions:

Time from admission to groin puncture was shorter in patients treated during office hours compared to non-office hours, however, time of treatment had no effect on reperfusion or clinical outcomes in ARISE II. Hourly admission pattern did not reveal bias against nighttime enrollment in the trial, increasing the applicability of these findings to a real world scenario

Keywords: Endovascular Therapy, Angiogram, Stroke

Financial Disclosures: Honoraria for lecturing from Cerenovus

E-Poster Presentation | Thursday, November 21, 2019 | 3:30 pm - 4:00 pm

E-Poster 165

First Pass Effect Rates and Outcomes with the SOFIA PLUS Catheter: A Single Center Experience <u>Hisham Salahuddin, MD¹, Alicia C Castonguay, PhD¹, Sidra Saleem, MD¹, Richard Burgess, MD, PhD¹, Mouhammed Jumaa, MD¹, Syed F Zaidi, MD¹</u>

¹University of Toledo, Toledo, Ohio, USA

Introduction:

The first pass effect (FPE) has been associated with improved clinical outcomes and decreased mortality rates; however, limited data exists on the FPE in the context of large bore catheters. Here, we report the FPE with the 6F Sophia Plus catheter (SPC) at our center.

Methods:

Upon institutional review board approval, we retrospectively identified consecutive patients undergoing MT with use of the SPC between January 2017 and June 2019. Baseline, presentation, treatment, clinical outcome, and procedural variables were collected. Rates of good clinical outcome (mRS \leq 2) were compared between FPE (TICI 3) and non-FPE patients.

Results:

Mean age of 85 patients included in our analysis was 70.1 \pm 13.8 years. Median baseline NIHSS was 17. Successful recanalization was achieved in 95% of patients, with an overall FPE and modified FPE (TICl≥2b) of 28.2% (24 patients) and 60% (51 patients), respectively. Good clinical outcome at 90-days was achieved in 50.6% of patients. Good clinical outcome was achieved in 66.7% of patients with FPE and 69.4% of patients without FPE (p=0.053). Multivariate analysis showed modified FPE as an independent predictor of good clinical outcome (p=0.01). SPC was used as a first line catheter in 76 (89.4%) patients, as a rescue catheter in 9 (10.6%) patients, and required a rescue catheter in 4 (5.3%) cases. Patients in whom SPC was used as a primary catheter, FPE was an independent predictor of good clinical positioning of SPC was achieved in all cases although two cases required use of a stentriever as an anchor to help advance the SPC. Distal embolization occurred in 10.6% patients and there was one patient with embolization to a new territory.

Conclusions:

Our study demonstrated high rates of FPE and mFPE with the SPC, with mFPE as an independent predictor of good clinical outcome at three months.

Keywords: Access Catheters, TICI, Mechanical Thrombectomy, Acute Ischemic Stroke Intervention, Acute Stroke

Financial Disclosures: The authors had no disclosures.

E-Poster Presentation | Thursday, November 21, 2019 | 3:30 pm - 4:00 pm

E-Poster 166

Impact of Time to Treatment and Imaging Modality on Early and Late Widow Thrombectomy Outcomes

<u>Raul G Nogueira, MD¹</u>, Tudor G Jovin, MD², Diogo C Haussen, MD¹, Rishi Gupta, MD³, Ashutosh P Jadhav, MD², Ronald F Budzik, MD⁴, Blaise Baxter, MD⁵, Antonin Krajina, MD⁶, Alain Bonafe, MD⁷, Ali R Malek, MD⁸, Ana P Narata, MD⁹, Ryan Shields, MD¹⁰, Yanchang Zhang, MD¹⁰, Patricia Morgan, MD¹⁰, Bruno Bartolini, MD¹¹, Michael Frankel, MD¹, Erol Veznedaroglu, MD¹², David Liebeskind, MD¹³

¹Emory University, Atlanta, Georgia, USA; ²University of Pittsburgh, Pittsburgh, Pennsylvania, USA; ³Wellstar Medical Group, Atlanta, Georgia, USA; ⁴OhioHealth Riverside Methodist Hospital, Columbus, Ohio, USA; ⁵Erlanger Medical Center, Signal Mountain, Tennessee, USA; ⁶Charles University, Hradec Kralove, Czechia; ⁷University Hospital Center, Montpellier, Montpellier, France; ⁸Jupiter Medical Center, West Palm Beach, Florida, USA; ⁹Bretonneau Hospital, Tours, France; ¹⁰Stryker, Kalamazoo, USA; ¹¹Lausanne University Hospital, Lausanne, Switzerland; ¹²Drexel Neurosciences Institute, Philadelphia, Pennsylvania, USA; ¹³UCLA Health, Santa Monica, California, USA

Introduction:

The impact of time to endovascular treatment and imaging modality on the outcomes of mechanical thrombectomy within 24 hours from stroke onset remains poorly understood.

Methods:

Trevo Registry patients with occlusions in the intracranial internal carotid artery or the M1 or M2 segments of the middle cerebral artery (MCA), pre-morbid modified Rankin scale (mRS) 0-2 and time to treatment 0-24 hours were categorized according to treatment times within the early (0-6-hour) or extended (6-24-hour) window. The patient subset with age≥18 years, baseline NIHSS≥10, ICA or M1 occlusion and pre-morbid mRS0-1 was defined as the "DAWN-like" cohort and served as the primary population for the treatment time analysis. Uni- and multivariate analyses were performed to evaluate the effect of time to treatment and imaging modality in terms of overall functional disability (mRS shift) and good outcomes (mRS 0-2) at 90 days within and across the early and late windows.

Results:

A total of 1603 out of the 2008 Trevo Registry patients qualified. Despite longer treatment times (median,9.6[7.2-13.8] vs.3.5[2.6-4.5] hours,p<0.001), late-treated (n=430) patients had similar rates of 90-day good outcomes (55.8% vs.60.1%,p=0.128), symptomatic intracranial hemorrhage (1.4% vs.1.5%,p=0.84), and 90-day-mortality (11.4% vs.10.9%,p=0.79) to early-treated (n=1173) patients. Time to treatment was significantly associated with both overall 90-day disability (aOR:0.75;95%CI[0.66-0.86],p<0.001) and good outcomes (aOR:0.73;95%CI[0.62-0.86],p<0.001) in early- but not late-treated (mRS shift:aOR:0.96;95%CI[0.90-1.02],p=0.15; mRS0-2:aOR:0.97;95%CI[0.90-1.04],p=0.41) "DAWN-like" patients. There were no differences in 90-day functional outcomes according to the use of CT perfusion versus non-contrast CT in either the early or extended windows.

Conclusions:

The impact of time to endovascular treatment on outcomes appears to be time dependent with a steep influence in the early window followed by a non-significant plateau in the extended window. While confirmatory data is needed, late-window endovascular treatment seems to remain beneficial even in the absence of advanced imaging.

Keywords: Acute Stroke, Endovascular, Mechanical Thrombectomy, Imaging, Trevo

E-Poster Presentation | Thursday, November 21, 2019 | 3:30 pm – 4:00 pm

Financial Disclosures: Phenox, Genentech, Anaconda, Biogen, Prolong Pharmaceuticals, Allm Inc., IschemaView, Viz-AI, Philips, Corindus Vascular Robotics. Stryker Neurovascular, Covidien/Medtronic

E-Poster Presentations | Friday, November 22, 2019 | 3:30 pm - 4:00 pm

E-Poster 167

Larger bore catheter size does not enhance reperfusion with the combination thrombectomy technique.

<u>Bhageeradh Mulpur, MD</u>¹, Megha Gupta, student², Kristopher Southard, MD¹, Lacy Handshoe, MD¹, Ahmad Khaldi, MD, MS³, William Humphries, MD³, Muhammad s Hussain, MD¹

¹Cleveland Clinic Foundation, Cleveland, Ohio, USA; ²Woodward Academy, Atlanta, Georgia, USA; ³Wellstar Medical Group, Marietta, Georgia, USA

Introduction:

Thrombectomy has become the standard of care for patients with large vessel occlusion (LVO) if they meet certain clinical and imaging parameters. The techniques to achieve successful reperfusion vary, with larger bore catheters being developed for aspiration. We sought to determine if larger catheters improved reperfusion with the combination stent retriever/aspiration technique.

Methods:

This is a retrospective study between two institutions of consecutive patients treated with thrombectomy from 1/1/17 to 6/30/19. Patients who underwent combination technique were analyzed and separated into smaller bore aspiration catheters (060/064) versus larger bore catheters (068/071/072). Demographic, clinical, radiographic and procedural data was collected to assess for impact on reperfusion and hemorrhages. Successful reperfusion was defined as TICI 2B/3 and presence of hemorrhage was recorded on follow up imaging. A binary logistic regression model was constructed to assess for predictors of successful reperfusion.

Results:

A total of 674 patients with a mean age of 68±14 years and median NIHSS of 16 [IQR 9-21] were treated. Successful reperfusion was achieved in 593(88%) patients and 108 (16%) were found to have asymptomatic or symptomatic hemorrhages. Patients treated with larger catheters had longer mean procedure times 61±32 minutes vs. 34±26 minutes (p<0.001) and required more passes 2.5±1.6 vs. 1.8±1.1 (p<0.001). In binary logistic regression modelling after adjusting from location of clot, age and NIHSS patients treated with smaller catheters had a higher success of reperfusion OR 3.03 [95%CI 1.1-8.3, p<0.03].

Conclusions:

Smaller catheter sizes may be adequate to achieve reperfusion with the combination technique. This may be advantageous with trackability and possibly less injury to the vessel. Further study is required in a prospective manner to discern if these findings can be replicated.

Keywords: Access Catheters, Acute Stroke, Acute Ischemic Stroke Intervention

Financial Disclosures: The authors had no disclosures.

E-Poster 168

Impact of Procedural Techniques on Clinical Outcomes in treating LVOs with Endovascular Therapy ASSIST Registry

<u>Rishi Gupta, MD, MBA¹</u>, Ansaar Rai, MD², David Liebeskind, MD³, Antonin Krajina, MD⁴, Marios-Nikos Psychogios, MD⁵, Alejandro Tomasello, MD⁶, Timo Krings, MD⁷, Woong Yoon, MD⁸, Osama O Zaidat, MD⁹, Ajit Puri, MD¹⁰, Markus Mohlenbruch, MD¹¹

¹Wellstar Medical Group, Neurosurgery, Marietta, Georgia, USA; ²West Virginia University Medical Center, Charleston, West Virginia, USA; ³UCLA, Los Angeles, California, USA; ⁴Charles University, Prague, Czechia; ⁵University Medical Center, Gottingen, Germany; ⁶Vall d'Hebron Research Institute, Barcelona, Spain; ⁷Toronto Western Hospital, Toronto, Canada; ⁸Chonnam National University, Seoul, Korea (Democratic People's Republic of); ⁹Mercy Medical Center, Toledo, Ohio, USA; ¹⁰University of Masschussetts, Worcester, Massachusetts, USA; ¹¹Heidelberg, Heidelberg, Germany

Introduction:

Different treatment strategies employed for endovascular thrombectomy (EVT) may impact successful reperfusion and functional outcome. The five randomized trials did not mandate a specific treatment strategy be utilized and thus operators have evolved with varied techniques. The aim of the ASSIST registry is to collect real-world data to develop clinical evidence regarding EVT in large vessel occlusions (LVOs). Analysis include evaluating which strategies are associated with first pass reperfusion and better clinical outcomes.

Methods:

Prospective, global, consecutive enrollment registry (up to 1500 subjects) of acute ischemic stroke patients (AIS) with LVO treatment in anterior circulation treated with one of five interventional techniques [Stentriever + Balloon guide catheter (BGC); Stentriever + Aspiration ± BGC; Aspiration ± BGC] using Stryker Neurovascular devices for the first pass. Patients will be equally distributed in each arm with accommodations made for reducing heterogeneity by geographical and operator location.

Results:

A total of 135 patients have been enrolled to date across 10 centers. Severity of disability (90-day mRS 0-2) and procedural outcome (eTICI 2c or greater on first pass as adjudicated by core lab) will be evaluated for each technique. Secondary clinical outcomes include NIHSS drop of ≥10 points from baseline or NIHSS score of 0 or 1. Safety outcomes include mortality, neurological deterioration, symptomatic intracerebral hemorrhage (ICH) and embolization to a new territory. Baseline, follow-up and angiographic outcomes will be core lab adjudicated.

Conclusions:

There is limited evidence demonstrating clinical benefit or impact on outcomes based on the treatment strategy being employed to treat LVO with EVT. The ASSIST Registry will collect global real-world benchmark data on a large AIS population. Study results will provide valuable information on the relative effectiveness of different EVT treatment techniques and aid in the identification of optimal treatment approaches.

Keywords: Acute Ischemic Stroke Intervention, Acute Stroke, Balloon Guide Catheter, Endovascular Therapy

Financial Disclosures: Principal Investigator ASSIST Registry, Modest Stryker Neurovascular Principal Investigator Tiger Retriever, Modest Rapid Medical Principal Investigator RECCLAIM II trial, no funding Zoll Medical Consultant: Cerenovous, Modest
E-Poster Presentations | Friday, November 22, 2019 | 3:30 pm - 4:00 pm

E-Poster 169

Rescue Stenting in Failed Thrombectomy: Back to the future? A Multi-Center Experience & Systemic Review

<u>Haris Kamal, MD¹</u>, Muhammad K Ahmed, MD¹, Alicia M Zha, MD¹, Amrou Sarraj, MD¹, Gary R Spiegel, MD¹

¹University of Texas at Houston, Houston, Texas, USA

Introduction:

With advent of second generation stent retrievers recanalization rates and outcomes have dramatically improved in Mechanical Thrombectomy(MT). However MT still fails in upto 16-29% of cases as reported in trials. This is higher with intracranial atherosclerotic occlusions. In such instances, intracranial stenting(RIS) used as rescue therapy may portend to a better prognosis than no recanalization. We analysed cases of RIS at our institution and conducted a systemic review of emerging data in this field.

Methods:

Retrospective review of patients undergoing MT at single institution encompassing 3 CSCs between August 2016 and August 2019. We identified patients who underwent MT but failed recanalization in the ICA or MCA M1 segment.Patients were dichotimized into 2 groups, RIS vs No RIS with persistent occlusion. Clinical, demographic factors were compared using univariate analysis. Primary and Secondary endpoints were assessed as recanalization, sICH and good outcomes(mRS 0-3) at discharge among the 2 groups.

Results:

MT failed in 31(4%) patients out of 654 who underwent MT for AIS due to ICA or M1 occlusion. Among these 31 patients, 21 patients underwent RIS while 10 patients failed MT with no recanalization. 4 patients had basilar occlusions with 2 undergoing basilar artery stenting and other 2 having failed recanalization. Patients in RIS group were significantly younger (mean age 65 vs 74, P=0.01), lower NIHSS(14±6 vs 20± 7, P=0.05), higher ASPECTS(9±1 vs 7±3, P=0.13). Though limited by small numbers,RIS group showed higher rate of good outcomes(mRS 0-3, 52%vs20%,P=0.1) without increasing sICH(0%vs10%,P=0.16) or mortality(9% vs 40%,P=0.06). Post procedure all patients undergoing RIS were treated with Eptifibatide or Abximab with no sICH. Our results are consistent with the previously reported literature which will be detailed in systemic review.

Conclusions:

Rescue stenting may be a viable option as last resort in unsuccessful thrombectomy, further studies are needed to delineate appropriate timing of RIS in difficult cases.

Keywords: Acute Ischemic Stroke Intervention, Mechanical Thrombectomy, Stenting, Intracranial Stenosis Stenting And Angioplasty, Revascularization

Financial Disclosures: The authors had no disclosures.

E-Poster 170

Mechanical Thrombectomy as Part of The Armenian Stroke Initiative: A Revolution of National Healthcare

<u>David Sahakyan, MD¹</u>, David Sahakyan, MD¹, Zhora Baghdasaryan, MD¹, David Margaryan, MD¹, Aleksan Petrosyan, MD¹, Mikayel Grigoryan, MD²

¹Erebouni Hospital Comprehensive Stroke Center, Yerevan, Armenia; ²Adventist Health Glendale Comprehensive Stroke Center, Glendale, California, USA

Introduction:

Acute ischemic stroke treatment in Armenia prior to 2019 was performed incidentally and sporadically due to lack of systems of care and insurance coverage. February 1, 2019 signified the commencement of the Armenian Stroke Initiative which included full financial coverage for thrombolysis and thrombectomy by Armenian government, as well as guidelines and protocols developed with the help of the "Stroke Initiative Advisory Task-force for Armenia" (SIATA), comprised of stroke experts from USA, Canada, and France

Methods:

Between February and September of 2019, a total of patients with acute stroke were admitted to our Comprehensive Stroke Center. Emergent CT/CTA and MRI/MRA were used to select patients eligible for acute interventions. Monoplane angiography system was used for thrombectomy.

Results:

A total of 1242 patient with a diagnosis of ischemic stroke were admitted between February and September 2019. Of those, 82 (6.6%) patients were treated with mechanical thrombectomy (versus a total of 2 in the entire 2018). Average patient age was 67.6 years, 57% were men. Mean NIHSS on admission was 16.7. 57% of the patients received intravenous thrombolysis. Mean door-to-groin puncture time was 94 minutes and groin-to-reperfusion time was 49 minutes. 94% of patients had an anterior circulation large vessel occlusion (LVO), 23% had tandem occlusions. Aspiration-only thrombectomy was utilized in 72% of patients, in the remaining 28% stenrievers were used. Thrombolysis In Cerebral Infarction (TICI) 2B or better reperfusion grade was achieved in 82.9% of the patients. Average hospital stay was 9.9 days. Modified Rankin Scale (mRS) score of 2 or less was achieved in 50.1 of patients on discharge. Mortality was 16%.

Conclusions:

Despite preexisting technical and logistical limitations, systematization and optimization of stroke care in Armenia achieved excellent results in mechanical thrombectomy, comparable to those at advanced stroke centers in developed countries both in terms of volumes as well as outcomes.

Keywords: Neurointerventional Program, Endovascular, Treatment

Financial Disclosures: The authors had no disclosures.

E-Poster Presentations | Saturday, November 23, 2019 | 10:45 am - 11:15 am

E-Poster 171

Hyperdense Vessel Sign Modifies the Treatment Response to Stent Retriever versus Contact Aspiration

<u>Mahmoud H Mohammaden, MD, MSc</u>¹, Catarina Perry, MD², Leonardo Pisani, MD¹, Marta Olive-Gadea, MD³, Alhamza R Al-Bayati, MD¹, Diogo C Haussen, MD¹, Bernardo Liberato, MD¹, Srikant Rangaraju, MD¹, Michael Frankel, MD¹, Raul G Nogueira, MD¹

¹Department of Neurology, Emory University School of Medicine, Grady Memorial Hospital, Atlanta, Georgia, USA; ²Neuroradiology department, Centro hospitalar Universitario Lisboa central, Lisboa, Portugal; ³Department of Neurology, Hospital Vall d'Hebron, Barcelona, Spain

Introduction:

First pass effect (FPE) has emerged as a key metric of efficacy for thrombectomy devices. It remains unknown whether thrombus composition influences the treatment response to different reperfusion modalities. As the hyperdense vessel sign (HDVS) on non-contrast CT brain (NCCT) indicates higher clot content of red blood cells, it has the potential to serve as an imaging biomarker for device selection.

Methods:

Consecutive anterior circulation large vessel occlusion patients undergoing thrombectomy with either stent retriever (SR) or contact aspiration (CA) as first line therapy from 2012-2018 were analyzed. Pre-treatment NCCT scans were evaluated for the presence of HDVS. The primary outcome was first-pass effect complete reperfusion (FPE, mTICI 2c/3). Uni- and multivariate analyses were performed to identify the independent predictors of FPE. The interaction between HDVS and thrombectomy modality on FPE was evaluated to explore potential differences in treatment response across the two techniques as a function of HDVS.

Results:

A total of 779 patients qualified for the analysis (median (IQR) age, 64 years (53-75), baseline NIHSS 17 (12-21), ASPECTS 8 (7-9), First line treatment: SR, 81%, CA, 19%). HDVS and FPE were reported in 473 (60.7%) and 286 (36.7%) of the patients, respectively. Age (OR1.01;95%CI [1.001-1.023]; p=0.04) and the use of balloon guide catheter (OR2.077;95%CI [1.242-3.473]; p=0.005) were independent predictors of FPE. Patients with HDVS had significantly higher rates of FPE with stent-retrievers (SR 41.3% vs. CA 22.2%, p=0.001; adjusted OR 2.108, 95% CI [1.201-3.700], p=0.009) while non-HDVS patients had a non-significant FPE advantage with contact aspiration (CA 41.4% vs. SR 33.9%, p=0.28). The presence of a HDVS significantly modified the effect of thrombectomy modality on first pass reperfusion (p=0.01).

Conclusions:

Our data suggest that the patients with HDVS may have a better response to stent-retrievers while those without HDVS might be better treated with contact aspiration. Confirmatory prospective studies are warranted.

Keywords: Acute Ischemic Stroke Intervention, Ischemic Stroke, Balloon Guide Catheter, TICI

Financial Disclosures: The authors had no disclosures.

E-Poster 172

Endovascular therapy vs Medical Management for Emergent Medium Vessel Occlusion Strokes in Anterior Circulation

<u>Hamidreza Saber, MD</u>¹, Shashvat Desai, MD², Diogo Haussen, MD³, Alhamza Al-bayati, MD³, Muhammad Waqas, MD⁴, Gary Rajah, MD⁴, Jason Davies, MD⁴, Maxim Mokin, MD⁵, Elliot Pressman, MD⁶, Nima Aghaebrahim, MD⁷, Andre Monteiro, MD⁷, Santiago Ortega, MD⁸, Raul Nogueira, MD³, Ameer E Hassan, MD⁹, Ashutosh Jadhav, MD²

¹UCLA Department of Neurology, Los Angeles, USA; ²UPMC Department of Neurology, Pittsburgh, USA; ³Emory University Department of Neurology, Atlanta, USA; ⁴Department of Neurosurgery, University at Buffalo, Buffalo, USA; ⁵Neurology and Neurosurgery, University of South Florida, Tampa, USA; ⁶University of South Florida, Tampa, USA; ⁷Baptist Neurological Institute, Jacksonville, USA; ⁸Department of Neurology and Radiology, University of Iowa, Iowa, USA; ⁹Department of Interventional Neurology, University of Texas–Rio Grande Valley, Harlingen, USA

Introduction:

Randomized trials have shown the efficacy of endovascular therapy (EVT) for emergent large vessel occlusion strokes. The benefit of EVT for emergent medium vessel occlusion (MVO) remains unclear.

Methods:

We performed a multicenter retrospective cohort study pooling patient data with anterior circulation emergent MVO, defined as any segment of the anterior cerebral artery (ACA) or distal middle cerebral artery (MCA, M3 segment) from 7 U.S. centers. Patients were divided into EVT and medical management groups. Primary outcome was excellent functional outcome defined as 90-day modified Rankin Scale score 0-1. Secondary outcomes included 90-day mortality and symptomatic intracerebral hemorrhage. MVOs from emboli to the new or distal territories were excluded. We compared outcomes using logistic regression and propensity score matching.

Results:

A total of 128 patients (71 men [55%]; mean age, 67.4years; 87 M3 [68%]) were identified, of whom 88 received EVT and 40 received medical management. Patients in the EVT group were younger (mean 65[SD 15.3] vs 72[16]years) and had higher pre-treatment NIHSS scores (mean 15[SD 8.8] vs 11.7[6.5]). The rate of excellent outcomes was greater in EVT (34 [39%]) than for medical management (10[25%]). After adjustment for age, NIHSS score, initial Alberta Stroke Program Early Computed Tomographic Score (ASPECTS), intravenous Alteplase, and time from last-known-well to emergency room arrival, EVT had significantly higher odds of excellent outcome as compared to the medical management (odds-ratio[OR], 2.7; 95%CI, 1.8-6.7;P =0.03). Estimation of average treatment effects based on propensity scores demonstrated 25% increased probability of excellent outcome with EVT (95%CI, 7%-44%;P<0.01). No statistical differences were found in symptomatic intracerebral hemorrhage or mortality (OR, 0.23; 95%CI, 0.04-1.60, and OR, 1.2; 95%CI, 0.5-3.3, respectively).

Conclusions:

Our multicenter study suggests that EVT is safe and may be effective for emergent ACA/M3 strokes presenting with relatively higher NIHSS scores. A randomized clinical trial is needed to confirm these findings.

Keywords: Ischemic Stroke, Acute Ischemic Stroke Intervention, Endovascular Therapy

E-Poster Presentations | Saturday, November 23, 2019 | 10:45 am - 11:15 am

Financial Disclosures: The authors had no disclosures.

E-Poster 173

Recurrent Thrombectomy in Patients with Prior Mechanical Endovascular Revascularization: Multicenter Experience

<u>Ghada A Mohamed, Resident of Neurology</u>¹, Hassan Aboul Nour, Resident¹, Vasu A Saini, Fellow², Jacob Morey, Medical student³, Andrea Holcombe, PhD researcher⁴, Robert Kowalski, MD, researcher¹, Dileep R. Yavagal, interventional neurology², Santiago Ortega Gutierrez, Interventional Neurology⁴, Johanna Fifi, Interventional Neurology³, Horia Marin, Interventional Radiology⁵, Stephan A Mayer, Senior staff Neurology¹, Daniel Miller, Senior staff Neurologist¹

¹Henry Ford Neurology, Detroit, Michigan, USA; ²University of Miami, Miami, Florida, USA; ³Icahn school of medicine Mount Sinai, New York, New York, USA; ⁴University of Iowa, Iowa city, Iowa, USA; ⁵Department of Neuro-radiology at Henry ford Hospital, Detroit, Michigan, USA

Introduction:

Mechanical endovascular reperfusion therapy (MER) is the gold standard for acute large vessel occlusion (LVO) stroke management. Five-years stroke recurrence risk is 25%, with limited available data about efficacy and long-term complications of recurrent thrombectomy (RT).

Methods:

This is a retrospective multicenter cohort of patients who underwent MER in four tertiary institutions from March 2016 till March 2019. Demographic, procedural, imaging and outcome data were evaluated.

Results:

1554 patients underwent MER, 28 (2%) had at least 1 RT. Twenty-five patients (89.3%) had 1 RT, 2 (7.1%) had 2 RT, and 1 (3.6%) had 3 RT. Median age was 64. Fifteen (53.6%) were females. Anterior circulation stroke occurred in 23 (82.1%) and 22 (78.6%) patients in first and second LVO respectively and 17 (60.7%) were cardio-embolic. Median time between the index MER and first RT was 6 days. Fifteen patients (53.6%) had re-occlusion during hospitalization.Thirteen (46.4%) had recurrent LVO of same artery, 8 of these (61.5%) required angioplasty or stenting during the first RT. Twenty-six (92.9%) achieved successful reperfusion (TICI 2b-3) after the first RT. Post procedure ICH was 2 (7.1%) and 4 (14.4%) patients after index MER and first RT respectively (P=0.3). Compared to index MER, post-procedural NIHSS was higher following first RT (median: 7 vs 14, P=0.054). Twenty patients had follow up mRS after index MER, 12 (60%) had favorable mRS (mRS≤3), 6 of these remained in same mRS category after first RT, 2 shifted into more severe disability (mRS 4-5), and 4 died. Overall mortality was 28.6% (N=8).

Conclusions:

In patients presenting with recurrent LVO, RT can be effective and preserve good outcomes in about half of cases when it is attempted. About half of cases involve early re-occlusion of the previously-treated artery. Prior MER might cause endothelial injury with predilection for local in-situ thrombosis or de-novo stenosis and re-occlusions.

Keywords: Endovascular Therapy, Intracranial Stenosis Stenting And Angioplasty, TICI

Financial Disclosures: The authors had no disclosures.

E-Poster Presentations | Saturday, November 23, 2019 | 10:45 am - 11:15 am

E-Poster 174

Baseline Characteristics of Symptomatic Carotid Webs: A Case Control Study

<u>David Landzberg, MD</u>¹, Diogo C Haussen, MD¹, Raul G Nogueira, MD¹, Alhamza Al-Bayati, MD¹, Song J Kim, MD¹, Mehdi Bouslama, MD¹, Catarina Perry da Camara, MD¹, Michael Frankel, MD¹, Fadi B Nahab, MD¹, Nicolas Bianchi, MD¹

¹Department of Neurology, Emory University and Marcus Stroke and Neuroscience Center, Atlanta, Georgia, USA

Introduction:

Symptomatic carotid web (CaW), a form of intimal fibromuscular dysplasia (FMD), is a cause of ischemic strokes (AIS) in the young, yet little is known about the demographics of these patients. This study sought to investigate the baseline characteristics of individuals presenting with a symptomatic CaW.

Methods:

We retrospectively identified 31 patients diagnosed with symptomatic CaW at a comprehensive stroke center between 2014 - 2018. These patients were matched at a 1:4 ratio to a control group diagnosed with ischemic stroke secondary to non-carotid web etiologies over the same time period from the local GetWithTheGuidelines stroke database. The matching method used weighted Euclidean distances and controlled for age and NIHSS.

Results:

Of 4071 patients with AIS, 124 control non-CaW AIS were matched to the 31 CaW. Non-CaW AIS were due to large artery atherosclerosis in 25.8%, undetermined etiology in 25.0%, cardioembolism in 22.6%, small vessel occlusion in 16.9%, and other determined etiology in 9.7%. Symptomatic CaW patients (average age 48.9 vs 48.4, p=0.85) were significantly more likely to be female [71.0% (22/31) vs 42.7% (53/124), p=0.005, LR: 8.08] and African American [83.9% (26/31) vs 62.9% (78/124), p=0.024, LR: 5.44]. Symptomatic CaW patients less commonly had modifiable vascular risk factors with a lower prevalence of hypertension [41.9% (13/31) vs 62.9% (78/124), p=0.034], tobacco use [12.9% (4/31) vs 33.9% (42/124), p=0.022], and alcohol abuse or illicit drug use [6.5% (2/31) vs 25.8% (32/124), p=0.020]. Additionally better outcomes were associated with symptomatic CaW patients as they had a lower modified Rankin Scale at discharge (median mRAS of 1.0 vs 3.0, p<0.001) and a greater percentage of patients being discharged to home [83.9% (26/31) vs 54.0% (67/124), p=0.002].

Conclusions:

Symptomatic CaW is associated with the female sex and African American ethnicity, while having less commonly modifiable vascular risk factors and more commonly superior hospital outcomes.

Keywords: Acute Stroke, Carotid, Cerebrovascular Disease, Stroke

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS: PRIMARY CATEGORY - CASE REPORTS

Poster 2 & E-Poster 2

Rare case of rapidly recurrent basilar artery thrombosis treated with emergent mechanical thrombectomies and stenting

Mark Cohen, MD¹, Amna Imran, MD¹, Ankur Garg, MD²

¹University of Central Florida/HCA GME Consortium, Orlando, Florida, USA; ²Orlando Neurosurgery, Orlando, Florida, USA

Introduction:

Acute basilar artery thrombosis (ABAT) is a life-threatening condition that can be treated by emergent mechanical thrombectomy (EMT). Recurrent acute basilar artery thrombosis is a rare phenomenon. Here we describe a case of rapid recurrent ABAT that was treated each time by EMT and finally by emergent basilar artery stenting with good outcome.

Methods:

A 66-year old male with known history of HTN, HLD, and DM presented with acute upper extremity ataxia, dysarthria, diplopia, and right-sided numbness. NIHSS on presentation was 13, CT head revealed a hyperdense basilar artery (confirmed by subsequent CTA), and CTP showed penumbra within the pons. He was taken for EMT, which was successfully performed using stent retriever and aspiration. Severe stenosis of the basilar artery was noted post-thrombectomy. Two hours later the patient was noticeably worse. He was obtunded with right hemiparesis and severe dysarthria. Repeat CT head again demonstrated a hyperdense basilar artery, concerning for re-thrombosis, and he was taken again for EMT. Angiogram confirmed recurrent ABAT, which was again successfully recanalized using stent retriever and aspiration. Persistent high-grade stenosis at the proximal basilar artery was noted and was determined to be the site of thrombus formation. The patient was anticoagulated with a total of 7500 units of heparin. Another angiogram was obtained 15 minutes post-thrombectomy and heparin administration and repeat ABAT was again noted at the site of basilar stenosis. We then made the decision to proceed with emergent basilar artery stenting as a life-saving measure. A drug-eluting balloon-mounted stent was successfully deployed and he was subsequently started on DAPT.

Results:

By day 2 of hospitalization, he had significantly improved with NIHSS of 2.

Conclusions:

This rare case of rapidly recurrent ABAT secondary to underlying severe stenosis and likely ruptured plaque was shown to have a good outcome after repeat EMT and emergent stenting.

Keywords: Acute Ischemic Stroke Intervention, Mechanical Thrombectomy, Stenting, Basilar, Thrombosis

Financial Disclosures: The authors had no disclosures.

Poster 4 & E-Poster 4

Autoimmune Systemic Diseases Presenting as Stroke Mimics

Tamour khan Tareen, Neurology Resident¹, Wei Liu, Assistant Professor¹

¹University of Louisville, Louisville, Kentucky, USA

Introduction:

Stroke mimics with acute neurological deficits represent a significant percentage of all stroke admissions. Stroke mimics can rarely be an initial presentation of autoimmune diseases. We present 2 cases presenting with acute ischemic symptoms with large vessel occlusion signs but diagnosed with new onset autoimmune diseases [1].

Methods:

Case reports.

Results:

1. 34-year-old female presented to ER with right sided paresthesia and aphasia, that resolved by the time Neurology evaluated her. MRI brain, MRA head and neck were normal. CBC showed hemoglobin 8.3, platelets 12,000. elevated reticulocytes, LDH, low haptoglobin consistent with hemolytic anemia. Peripheral smear revealed 3-4 schistocytes. ADAMTS13 activity was decreased to 17% with detected ADAMTS13 inhibitor 2.5 Bethesda Units consistent with immune thrombotic thrombocytopenic purpura (iTTP). Patient was treated with plasmapheresis and high-dose steroids.

2. 48-year-old female presented with left sided weakness and confusion. Patent was disoriented with left hemiplegia, right gaze deviation, left hemi-sensory loss, and neglect with NIHSS of 18. MRI brain, CTA head/neck were normal. CTH perfusion showed increased perfusion on right. Neck examination showed enlarged thyroid. Symptoms completely resolved next day. Laboratory showed elevated TSH (37) and suppressed T3/T4 levels. Anti-TPO antibody titer was > 900 IU/ml. Thyroid ultrasound demonstrated enlarged, hyper-vascular gland consistent with Hashimoto's thyroiditis. Patient was discharged with steroids and thyroid hormone supplements.

Conclusions:

Autoimmune disorders can present with various neurological manifestations. However, it is rare for such disorders to mimic acute ischemic stroke with large vessel occlusion signs. Our presentations suggested autoimmune disorders should be considered when patient has stroke mimics[2,3].

Keywords: Stroke, Ischemic Stroke, Inflammation

Financial Disclosures: The authors had no disclosures.

Poster 5 & E-Poster 5

Endovascular Management of Azygos Anterior Cerebral Artery Stroke: A Case Report <u>Shakaib Qureshi, MD¹, Kasim Qureshi, MD¹, Muhammad U Farooq, MD, FAHA, FACP²</u>

¹Mercy Health Hauenstein Neurosciences/Michigan State University, Grand Rapids, Michigan, USA; ²Mercy Health Hauenstein Neurosciences, Grand Rapids, Michigan, USA

Introduction:

Bilateral anterior cerebral artery (ACA) territory infarction is very rare among ischemic strokes. However, this can occur with azygous anterior cerebral artery (AACA). We report a rare case of an AACA stroke, an 84-year-old female with a history of fibrillation (not anticoagulated) who was found to have apathy and bilateral upper and lower extremity deficits after waking from sleep.

Methods:

On presentation her NIHSS was 20. She demonstrated abulia and was plegic in bilateral lower extremities and right upper extremity. Additionally, unable to voluntarily move left upper extremity to command with relatively preserved strength. Patient was outside intravenous alteplase window. Initial imaging demonstrated chronic left parietal infarct and left AACA with proximal occlusion. Cerebral angiography re-demonstrated left A1 occlusion. She underwent successful mechanical thrombectomy with TICI 3 recanalization of the AACA.

Results:

Post intervention, the patient continued to have lethargy and abulia. She had some improvement in left leg weakness, however, rest of the exam was unchanged. MRI brain confirmed acute-subacute bilateral ACA territory infarction (greater on the left) including bilateral caudate, corpus callosum and peripheral extension to left motor area. She continued to be apathetic and her family eventually pursued comfort care measures.

Conclusions:

Of its three well characterized anatomical variants, the azygous configuration of the ACA is the rarest at an estimated incidence of 0.3-2%. Though this variant is associated with distal ACA aneurysms, embolic stroke is rarely reported. Proximal occlusion with bilateral infarctions can present with abulia, incontinence, bilateral leg and proximal arm weakness. Additionally, lesions to the commissural fibers between frontal lobes and motor area can result in sympathetic apraxia. AACA infarction as a cause of quadraparesis is also reported. Cognizance of the AACA stroke should be maintained on the differential diagnosis as such symptoms can be mistakenly attributed to basilar stroke or brain stem pathology.

Keywords: Acute Ischemic Stroke Intervention, Cerebral Physiology

Financial Disclosures: The authors had no disclosures.

Poster 6 & E-Poster 6

Unusual Case of Spontaneous Carotid Artery Dissection with Concomitant Eagle Syndrome and Raeder Syndrome

Ritwik Bhatia, MD¹, Luis F Torres, MD², Sebastian Koch, MD¹

¹University of Miami/Jackson Memorial Hospital, Miami, Florida, USA; ²University of Texas Health Science Center at Houston - McGovern Medical School, Houston, Texas, USA

Introduction:

43 year old male presenting with severe, lancinating left sided facial pain associated with ipsilateral ptosis, tearing, and nasal congestion. Patient was discharged three days prior after presenting with similar symptoms. At that time, he was found to have left distal cervical ICA dissection on MRA head/neck without contrast.

Methods:

Patient was started on heparin drip due to concern for clot propagation, with subsequent moderate improvement of pain and ptosis. He was discharged on dual antiplatelet therapy after MRI brain was negative for acute stroke and TCD revealed no microemboli. Patient was also instructed to take acetaminophen as needed for pain control.

Results:

Patient then re-presented with recurrence of facial pain. Neurological exam demonstrated left eye ptosis, miosis, conjunctival injection, and tearing. CTA head/neck with contrast demonstrated elongated styloid process abutting the left internal carotid at the level of the dissection, which was not previously visualized well on MRA. Styloid process extended 2.6 cm, fulfilling criteria for Eagle syndrome, a rare clinical condition characterized by abnormally long styloid process causing radiating craniofacial or cervical pain. Patient also fulfilled criteria for Raeder syndrome, a progressive paratrigeminal oculosympathetic syndrome, likely a result of styloid process or dissection causing displacement of cranial nerves III, IV, V, and the sympathetic trunk. We treated his pain aggressively and expeditiously with methylprednisolone, verapamil, and amitriptyline to avoid centralization of his pain syndrome. Patient's pain markedly improved, and ptosis resolved. Patient was seen in the outpatient clinic three months later with interval resolution of carotid dissection on MRA head/neck and no symptom recurrence.

Conclusions:

This case illustrates an unusual presentation of spontaneous carotid artery dissection facilitated by an elongated styloid process (Eagle syndrome), resulting in progressive paratrigeminal oculosympathetic syndrome (Raeder syndrome). Identifying this concomitance of clinical entities is important in order to initiate appropriate and efficient diagnostic workup and management.

Keywords: Carotid, Cerebrovascular Disease, Diagnostic Neuroradiology, Treatment

Financial Disclosures: The authors had no disclosures.

Poster 8 & E-Poster 8

A rare diagnosis made based on clot composition

Mohammad Ammar Abdulrazzak, MD, Neurology PGY-4¹, Jeremy Payne, MD, PhD, FAHA²

¹University of Arizona, College of Medicine Banner University Medical Center- Phoenix, Phoenix, Arizona, USA; ²Banner University Medical Center-Phoenix, Phoenix, Arizona, USA

Introduction:

Advances in mechanical thrombectomy as a mainstream approach for treating hyper-acute ischemic stroke due to large vessel occlusion can allow for better understanding of the pathophysiology of stroke. Studying the composition of clots may provide valuable insight into the origin and etiology of strokes. We describe a case of a rare cardiac tumor that was diagnosed based on the microscopic analysis of an unusual "clot."

Methods:

A 65 year-old woman presented to the Emergency Department at an outside hospital with the chief complaint of dyspnea for 2 weeks. Initial evaluation in the ED was unremarkable. Her symptoms were thought to be related to reactive airways disease, as they started when patient was gardening. Prior to discharge, the patient acutely developed a right middle cerebral artery syndrome. CT of the head without contrast showed no acute hemorrhage or acute ischemic changes. CTA demonstrated proximal right middle cerebral artery occlusion. The patient received IV tPA at the outside hospital and was transferred to our facility for endovascular mechanical embolectomy. There was no clinical response to IV tPA.

Results:

A stent retriever was used to remove the material occluding the proximal right middle cerebral artery. The "clot" appeared to be white in color and gelatinous in texture. The patient had an excellent recovery with no residual deficits by the following day. The retrieved material was sent for microscopic analysis, and determined to be fragments of cardiac origin, likely valvular papillary fibroelastoma. Transesophageal echocardiogram showed fibrinous strands on the aortic valve leaflets. These were later resected endoscopically and confirmed to be a papillary fibroelastoma of the aortic valve.

Conclusions:

Analysis of the composition of specimens retrieved with endovascular mechanical thrombectomy may allow for better understanding of the pathophysiology and etiology of ischemic stroke, and directly inform diagnostic and management strategies.

Keywords: Acute Ischemic Stroke Intervention, Acute Stroke, Mechanical Thrombectomy, Pathophysiology, Endovascular Therapy

Financial Disclosures: The authors had no disclosures.

Poster 9 & E-Poster 9

A Case of MCA stroke with variable degree of hyperdense artery sign in CT scan

Mohamed A Attia, neurology fellow¹, Ossama Y Mansour, Professor of Neurology¹, Abdulrahman M Ibrahim Ali, Neurology fellow²

¹Alexandria University Hospital, Alexandria, Egypt; ²Port Said university Hospitals, Alexandria, Egypt

Introduction:

Hyperdense MCA sign in the CT brain is due to large intravascular clots and it is one of the earliest sign on imaging in cases of MCA strokes. It also allows thrombus composition to be determined. This may assist clinicians in deciding on the most appropriate therapeutic modality for individual patients which is invaluable to clinical outcomes of acute ischemic stroke patients.

Methods:

Case report A 76-year-old man with history of diabetes and PVD was brought to the ER complaining of sudden onset of right-sided weakness and facial drooping 5 hours before arrival. On physical examination, patient had right-sided neglect and right-sided gaze palsy. Motor examination showed grade 2 power on right upper and lower extremities. Babinski was positive on the right side. CT brain showed increased density of M1 segment of the MCA with several grades of densities and loss of grey white differentiation of MCA territory. ASPECT score was 8. Patient's NIHS score was 18. He was sent for Mechanical Thrombectomy and the clot was removed. Patient improved regarding conscious level and motor power on the right side improved to G3 on both right upper and lower limbs. 2 hours after Mechanical thrombectomy NIHS score dropped to 27. Follow up CT brain showed deep intracerebral and intraventricular hemorrhage. He was immediately sent to the operative room. Hemi-craniectomy, surgical evacuation of the hemorrhage and extra ventricular drain was done. He was put on dehydrating measures and antiepileptic.

Results:

He didn't show marked improvement in his neurological function immediately following the procedure. However, He showed significant improvement in functional status at 3-week follow-up.

Conclusions:

Presence or absence of HAS on pre-treatment plain CT scans may enable clinicians to predict the chronological age and the composition of the occlusive thrombus and hence the efficacy of treatment options.

Keywords: MCA, Acute Ischemic Stroke Intervention, Mechanical Thrombectomy, Angiographic Ct, Decision Analysis

Financial Disclosures: The authors had no disclosures.

Poster 10 & E-Poster 10

Complete Reversal Of Perfusion Deficit With Mechanical Thrombectomy: A Case Report Shakaib Qureshi, MD¹, Kasim Qureshi, MD¹, Muhammad U Farooq, MD, FAHA, FACP²

¹Mercy Health Hauenstein Neurosciences/Michigan State University, Grand Rapids, Michigan, USA; ²Mercy Health Hauenstein Neurosciences, Grand Rapids, Michigan, USA

Introduction:

The ultimate goal of endovascular intervention in ischemic stroke is to salvage penumbra from progressing to complete infarction. We present a 78 year old female with a middle cerebral artery (MCA) occlusion and complete rescue of penumbra after thrombectomy.

Methods:

Patient's history included hypertension, hyperlipidemia, prior stroke, and deep vein thrombosis (on anticoagulation). She presented with sudden onset upper extremity motor and speech deficits. Her NIHSS on presentation was 4 and worsened to 11 in the emergency department. Head computed tomography (CT) demonstrated remote left occipital infarct and CT angiography revealed M1 MCA occlusion with diminutive distal flow. The patient was not a candidate for intravenous alteplase (on anticoagulation). CT perfusion demonstrated candidacy for mechanical thrombectomy with 64 mL penumbra and 0 mL core. Complete TICI 3 recanalization was obtained with baseline perfusion scan to recanalization time of approximately 74 minutes.

Results:

Post-intervention the patient had complete resolution of her symptoms. Follow up imaging showed completely aborted stroke with no restricted diffusion on MRI brain. Her vascular workup was otherwise unremarkable and etiology was likely atherosclerosis with artery to artery embolism.

Conclusions:

In appropriately selected patients, endovascular thrombectomy for up to 24 hours (with or without indication for intravenous alteplase) is the standard of care. Studies have reported partial reversal of diffusion/perfusion deficits, and suggest complete reperfusion, shorter imaging to recanalization time and good collateral vessels as favorable factors. Evaluation of the final stroke volume is well described as both an independent predictor of clinical outcome and is also important for guiding further management. Our patient had complete resolution of deficits and aborted stroke on follow-up imaging despite a decent volume of perfusion deficit. This case also aligns with recently reported favorable outcome with shorter image acquisition to reperfusion time versus the traditionally emphasized symptom onset to groin puncture time.

Keywords: Acute Ischemic Stroke Intervention

Financial Disclosures: The authors had no disclosures.

Poster 11 & E-Poster 11

Unusual Pattern of Stroke Related to a Persistent Primitive Trigeminal Artery Ajaz Sheikh, MD¹, Hongyan Li, MD, PHD¹, Nurose Karim, MD¹

¹University of Toledo, Toledo, Ohio, USA

Introduction:

Embolic strokes through persistent carotid-vertebro-basilar anastomoses are unusual but need to be aware of in clinical practice.

Methods:

Here we present a case of a 59-year-old female with sudden onset headache and left homonymous hemianopsia. MRI of the brain showed acute infarction in the posterior temporal, parietal and lateral occipital lobes of the right hemisphere with extension into the corpus callosum. CTA and MRI both confirmed the presence of persistent primitive trigeminal artery (PPTA) originating from the cavernous portion of the right internal carotid artery and merged into the distal basilar artery. A large and tortuous right posterior communicating artery supplied the basilar tip from which small posterior cerebral and superior cerebellar arteries originated on the right side. The left posterior cerebral artery was of a fetal origin. The distal basilar and the vertebral arteries were very diminutive. Remaining stroke workup was unremarkable and the patient was discharged on Aspirin and Clopidogrel.

Results:

-

Conclusions:

Altered anatomy of cerebrovascular system, such as congenital malformations, should be considered in stroke patients with unusual clinical presentation. Embryonic carotid-vertebro-basilar anastomoses, such as the most common PPTA, can be the pathway for embolization directly from the internal carotid artery to the vertebrobasilar territory. Therefore, those who have strokes with mixed anterior- posterior patterns shoulder be investigated for such a possibility. PPTA variants are usually small in caliber, which makes their visualization and recognition difficult. Anomalous anastomoses between anterior and posterior circulation systems can be confirmed with conventional or magnetic resonance angiography. A trigeminal artery would be overlooked by a conventional carotid ultrasound. Magnetic resonance angiography has been shown to identify the trigeminal artery in a noninvasive manner.

Keywords: Cerebrovascular Disease, Stroke, Imaging, Epidemiology

Financial Disclosures: The authors had no disclosures.

Poster 12 & E-Poster 12

Pipeline Within Pipeline Approach For Persistent Enlarging Aneurysm And Failed Initial intervention: A Case Report

Shakaib Qureshi, MD¹, Kasim Qureshi, MD¹, Muhammad U Farooq, MD, FAHA, FACP²

¹Mercy Health Hauenstein Neurosciences/Michigan State University, Grand Rapids, Michigan, USA; ²Mercy Health Hauenstein Neurosciences, Grand Rapids, Michigan, USA

Introduction:

Flow diversion systems (FDSs) such as pipeline has conferred improvement in treating complex intracranial aneurysms. With increasing interventions, more aneurysm recurrences and treatment failures are also being observed for which optimal management is not clearly defined. Telescoped stent techniques have been used in the pre-pipeline era however complete telescoped placement of pipeline FDS within a previously placed device for treating recurrent or persistent aneurysm has been rarely reported.

Methods:

A 55-year-old female initially presented with sudden onset severe headache, neck pain, and profuse vomiting. Imaging revealed hydrocephalus and subarachnoid hemorrhage secondary to a 6mm fusiform aneurysm of the right V4 segment vertebral artery. This was amended with a 4.25mm x 20mm pipeline FDS placed across the neck of the aneurysm. Her symptoms improved but presented again three months later with a severe headache.

Results:

Repeat imaging revealed an enlarging residual aneurysm at the midportion of the pipeline protruding superior-lateral at the posterior inferior cerebellar artery (PICA)segment. A second 4.5mm x 14mm pipeline FDS was deployed completely within the previously placed pipeline across the neck of the aneurysm with excellent apposition. Post-procedure, imaging demonstrated stability and eventual cessation of symptoms.

Conclusions:

Nowadays, the scope of pipeline FDS has been expanded to include posterior circulation and recurrent aneurysms. Pipeline FDS may be favorable for aneurysms adjacent to branching vessels as the apertures in its construct allows for flow into the branch arteries. Furthermore, microsurgical procedures may put vessels such as PICA at risk, hence, a shift towards endovascular treatment for posterior circulation aneurysms is noticed. Telescoping pipeline FDS constructs have been used for initial intervention, however, no clear data is present on the length of overlap to prevent discontinuation. Pipeline FDS has also been described in the context of recurrent aneurysms however long-term efficacy is still unknown due to paucity of data.

Keywords: Aneurysm, Flow Diverter, Pipeline

Financial Disclosures: The authors had no disclosures.

Poster 13 & E-Poster 13

Thrombectomy In Patients With Zero NIHSS And A Distal Internal Carotid Artery Occlusion: Case Reports

<u>Suhas S Bajgur, MD, MPH</u>¹, Kaushik N Parsha, MD, MS¹, Faheem G Sheriff, MD¹, Spiros Blackburn, MD¹, Peng R Chen, MD¹, Nicole R Gonzales, MD¹, Amrou Sarraj, MD¹

¹University of Texas Health Science Center, Houston, Texas, USA

Introduction:

We describe two patients with NIHSS=0 and distal internal carotid artery occlusion (d-ICAO) presenting outside intravenous-tPA window, one of whom underwent thrombectomy and the other was medically managed. We illustrate the challenges in thrombectomy decision-making.

Methods:

Case-1: 72-year-old right-handed male (RH-M) with a history of hypertension and hyperlipidemia presented with two-episodes of transient left-side weakness. Patient was last seen normal (LSN) 12 hours prior to presentation. Alberta Stroke Program CT-Score (ASPECTS) was 10, CT-Angiogram (CTA) showed right d-ICAO. Patient was started on heparin infusion, until thrombectomy decision was made. Case-2: 47-year-old RH-M with history of hypertension, diabetes, hyperlipidemia, coronary artery disease, congestive heart failure, presented with transient left-facial droop and dysarthria. LSN 6 hours prior to presentation. ASPECTS was 10, outside-hospital CTA was read as right-ICA dissection with intracranial extension. A loading dose of aspirin/clopidogrel was administered prior to transfer.

Results:

In case 1, CT-Perfusion (CTP) showed right-MCA territory perfusion mismatch, patient underwent thrombectomy at 30 hours from LSN, achieved a Thrombolysis in Cerebral Infarction Score-3 recanalization. MRI showed small infarcts in the corresponding vascular territory and the etiology was large artery atherosclerosis. Modified Rankin score (mRS) at 90 day was zero. In case 2, CTP showed no perfusion mismatch, CTA showed right d-ICAO and not dissection. Thrombectomy was considered but then medically managed based on consensus. An echocardiogram showed left-ventricular thrombus and severe hypokinesis of apical wall. MRI showed punctate infarcts in the anterior choroidal artery (AchA) distribution. A left-heart-catheterization was planned but deferred when patient developed a new left-homonymous-hemianopsia (LHH) at 70 hours from presentation. Repeat MRI showed infarct extension in AchA distribution. Heparin was transitioned to warfarin. 90-day mRS was 1 for persistent albeit improved LHH.

Conclusions:

In patients with zero NIHSS and a large vessel occlusion decision for thrombectomy remains an area of clinical equipoise and deserves case-by-case analysis.

Keywords: Intra-Arterial Therapy, NIHSS, Angiographic Ct Perfusion, Acute Stroke, Medical Management

Financial Disclosures: The authors had no disclosures.

Poster 14 & E-Poster 14

Composition of Retrieved Thrombi in Acute Stroke from Carotid Web

<u>Sitara Koneru Achanti, M.D.</u>¹, Raul G Nogueira, M.D.¹, Ehizele Osehobo, M.D.¹, Gabriela Oprea, M.D.¹, Alhamza Al-Bayati, M.D.¹, Diogo C Haussen, M.D.¹

¹Emory University, Atlanta, Georgia, USA

Introduction:

Carotid web (CaW) is an intimal variant of fibromuscular dysplasia. CaW are a shelf-like filling defect in the posterior aspect of the carotid bulb, which leads to turbulent flow and stagnation, forming a nidus for thromboembolism. There is limited data on the histological architecture of clots generated by CaW.

Methods:

We present 2 patients who presented with large vessel occlusion ischemic strokes and received mechanical thrombectomy. Stroke workup failed to reveal other potential stroke etiologies besides the presence of an ipsilateral CaW. The clots retrieved by thrombectomy were fixated in formalin and sent for histopathologic analysis. This included qualitative histologic examination by an experienced pathologist and semi-automated quantitative thrombus composition analysis of three representative areas of the thrombus, reflecting the overall histoarchitecture. This analysis done using ImageJ software. The thrombi sections were 4 um thick, hematoxylin eosin stained, and examined at 400x, using an Olympus microscope and Olympus DP25 camera.

Results:

The patients a 42year-old female and a 55year-old female. Both with left middle cerebral M1 occlusion with dense vessel sign on non-contrast CT. Both treated with one pass stent-retriever pass and full clot extraction. The two clots on histological examination had similar histoarchitecture: the fibrin component showed irregular interlacing, whirling shapes sprinkled by leukocytes. This appearance is diametrically opposed to the regularly layered blood clot. Thrombus composition analysis of clot #1 yielded 54.68% fibrin, 38.57% RBC, and 6.75% WBC. Analysis of clot #2 yielded 48.17% fibrin, 43.49% RBC, and 8.34% WBC.

Conclusions:

The histopathologic appearance of thrombi in carotid web patients is in line with the suggestion that webs are the result of turbulent/non-laminar blood flow. The marginal WBC composition mimics what has been described in clots of typical stroke etiologies. The analyzed thrombi has a relatively high erythrocytic composition, compatible with the presence of hyperdense vessel sign. Further studies are warranted.

Keywords: Carotid, Mechanical Thrombectomy, Pathophysiology, Stroke

Financial Disclosures: The authors had no disclosures.

Poster 15 & E-Poster 15

ECMO causing falsely positive CTA and CTP

<u>Owais K Alsrouji, MD¹</u>, Hassan Aboul Nour, MD¹, Ghada A Mohamed, MD¹, Yamin Sallowm, MD¹, Ahmed Riad Ramadan, MD¹, Alex B Chebl, MD, FSVIN¹

¹Henry Ford Hospital, Detroit, Michigan, USA

Introduction:

Cerebral computerized tomographic angiography (CTA) and perfusion (CTP) imaging are invaluable in managing patients with Large Vessel Occlusion acute ischemic strokes. We present a case of falsely positive CTA and CTP in a patient on ECMO.

Methods:

N/A

Results:

70 year-old male, with CAD and CHFrEF, underwent CABG complicated by post-operative cardiorespiratory arrest requiring VA-ECMO. He remained comatose despite weaning off sedation. CT head without contrast was unremarkable. CTA showed complete non-opacification of the innominate, right common, internal carotid, bilateral vertebral (VA) and the basilar (BA) arteries. CTP with RAPID[™] analysis showed right MCA core infarct of 96 ml and mismatch volume of 244 ml involving the right hemisphere and posterior fossa structures. He was taken for mechanical embolectomy. DSA showed nonopacification of the same vessels as the CTA. Aspiration was performed of the innominate, RCCA and RICA but no thrombus was visible in the aspirate. Post aspiration angiography revealed patency of CCA, ICA and MCA but to-and-fro opacification of the innominate. Angiography of the right subclavian artery confirmed competitive ECMO arterial inflow via the right axillary artery. The VA and BA were patent. We propose that ECMO alternative arterial axillary circulation had caused the artifact of reduced flow seen on CTA and perfusion on CTP. High-pressure outflow from the ECMO (carrying non-contrasted blood) created retrograde flow into the right subclavian and innominate arteries and prevented entry of contrasted arterial blood from the heart, causing non-visualization of these vessels and their branches by CTA. Left carotid system received the contrasted blood directly from the heart due to laminar flow, causing the perfusion asymmetry on CTP.

Conclusions:

In patients on peripheral VA-ECMO, caution should be considered in interpreting perfusion and flow images due to blood shunting. When contrasted imaging is irreplaceable; delayed or extended bolus tracking may be an option.

Keywords: Vascular Imaging, Angiographic Ct Perfusion, Angiographic Ct, Cerebral Blood Flow

Financial Disclosures: The authors had no disclosures.

Poster 16 & E-Poster 16 Endovascular Revascularization of Chronic Total Occlusion of the Internal Carotid Artery: a Case Report Mohammed Ismail Resident¹ Alex B Chebl. Director, Vacc. Neurology¹

Mohammed Ismail, Resident¹, Alex B Chebl, Director, Vasc. Neurology¹

¹Henry Ford Hospital, Detroit, Michigan, USA

Introduction:

Internal carotid artery chronic total occlusion (CTO) is associated with a 6-20% annual risk of recurrent ipsilateral ischemic stroke despite intensive medical treatment. Surgical bypass trials have been negative in stroke prevention. We describe a case of successful ICA endovascular revascularization utilizing subintimal dissection/re-entry technique.

Methods:

A 60 year-old RHWF presented with sudden onset dysarthria and right facial droop with a NIHSS of 3. CT head showed acute left hemispheric hypodensity. CTA head/neck showed LICA and ACA occlusion and proximal RICA stenosis 60-70%. She refused treatment and returned 2 days later with left hemispheric stroke, NIHSS 11, confirmed by MRI. DSA showed flow-limiting 87% RICA stenosis, LICA occlusion with reconstitution in the proximal cavernous portion via ECA collaterals with poor left MCA filling, left A2 occlusion distal to ACom. CTP with diamox showed cerebral steal phenomenon (AKA Reverse Robin Hood Syndrome). To decrease the risk of ICH and hyperperfusion revascularization was delayed by one week.

Results:

Access was obtained via a 7F sheath placed in the distal LCCA. Then using a 300cm 0.014" CTO microwire and a 5F vertebral catheter to support and direct the microwire the proximal stump was traversed with the antegrade subintimal tracking technique. The wire was directed into the true lumen and pre-dilation was performed with a 2.5x20mm balloon. An EPD was placed in the ICA and a 7-9x40mm self-expanding stent was placed and post-dilated with a 4x20mm balloon. On final angiography there was complete recanalization and normalization of antegrade flow. Two weeks later the patient underwent RICA angioplasty and stenting following R hemispheric ischemia. She was continued on DAPT and lipid lowering agents. At 3-months follow-up she had no further ischemic events with a mRS=2 with improving aphasia.

Conclusions:

Endovascular recanalization is a potentially effective method of ICA CTO treatment.

Keywords: Carotid Stenting And Angioplasty, Atherosclerosis, Endovascular, Antiplatelet, Stroke

Financial Disclosures: The authors had no disclosures.

Poster 17 & E-Poster 17

Delayed Thrombectomy <u>Navpreet K Bains, DO, MBA¹</u>, Farhan Siddiq, MD¹

¹University of Missouri, Columbia, Missouri, USA

Introduction:

Endovascular thrombectomy is shown to be an effective treatment for acute stroke. Most recently, the DEFUSE-3 and the DAWN trials showed that the time window for endovascular treatment may be extended up to 24 hours. We present a case of a 70 year old man who underwent mechanical thrombectomy 4 days after onset of symptoms.

Methods:

N/A

Results:

Successful mechanical thrombectomy 4 days after onset of symptoms.

Conclusions:

In a carefully selected patients, thrombectomy quite possibly may be a potential option beyond the 16 or 24 hours since the onset of symptoms.

Keywords: Stroke, Balloon Guide Catheter

Financial Disclosures: The authors had no disclosures.

Poster 18 & E-Poster 18

Suboccipital Cisterna Magna Intrathecal Injection for Spinal Muscular Atrophy (SMA)

<u>Nitish Kumar, MD¹</u>, Vamshi Balasetti, MD¹, Raghav Govindarajan, MD¹, Farhan Siddiq, MD¹, Jacqueline Krause, MD¹, Adnan Qureshi, MD¹

¹University of Missouri, Columbia, Missouri, USA

Introduction:

We describe a technique of lateral suboccipital approach to cisterna magna to inject Spinraza-Nusinersen in a patient with SMA. Our patient was a 23 years old female with history of SMA II and had fusion of her spine extending from T3-S1. A lumbar approach was attempted initially but was unsuccessful due to extensive fusion.

Methods:

After obtaining consent, patient was placed in lateral decubitus position. After observing standard sterile protocol, the image intensifier was positioned to acquire a lateral view. The interspace between the mastoid process and first cervical vertebra was visualized with parallel alignment of both internal auditory meatus and skull base. A 25 gauge was used for local subcutaneous lidocaine injection. A 22-gauge 10 cm Ciba Biopsy Needle angulated perpendicular to transverse plane was advanced toward midline. The angulation of the needle was adjusted by holding the proximal end of the spinal needle by surgical forceps allowing the needle manipulation without placing the hand within the fluoroscopic beam. After the initial insertion of the needle into the subcutaneous tissue, the lateral plane was imaged using fluoroscopy and 22-gauge 10 cm Ciba Biopsy needle was advanced into the interspace between the posterior and inferior aspects of mastoid process and superior aspect of the first cervical vertebra. Spinraza- Nusinersen (12mg/5ml) was administered over 5 minutes after removal of 5 ml of Cerebrospinal fluid.

Results:

This technique was successfully performed 5 times. Each time Spinraza-Nusinersen was injected into cisterna magna by above approach. No complications were observed, and patient was discharged home after 3 hours of observation.

Conclusions:

Spinraza-Nusinersen is widely accepted treatment for all ages and types of spinal muscular atrophy. Usually given as 4 loading doses in first 2 months and then maintenance dose every 4 months for the rest of the life.The lateral suboccipital approach may be used to deliver this medication.

Keywords: Endovascular Therapy, Access Catheters, Angiographic Technology

Financial Disclosures: The authors had no disclosures.

Poster 19 & E-Poster 19

Ruptured Superior Thyroid Artery Pseudoaneurysm Treated Successfully with Onyx 18 (LES)

<u>Vamshi Krishna Sai Balasetti, MD</u>¹, Nitish Kumar, MD¹, Farhan Siddiq, MD¹, Camilo R Gomez, MD¹, Adnan I Qureshi, MD¹

¹University of Missouri Columbia, Columbia, Missouri, USA

Introduction:

Aneurysms of the external carotid artery are quite rare and have been reported infrequently. Etiology is varied with traumatic, non-traumatic or iatrogenic causes. Association with thyroid or parathyroid malignancy has been reported in the past. Treatment strategies range from conservative to surgical management. We report a rare case of refractory oropharyngeal bleeding resulting from rupture of superior thyroid artery pseudoaneurysm managed successfully by endovascular treatment strategy.

Methods:

Retrospective review of the patient information was performed and the details included: A 26-year-old incarcerated male presented to an outside facility with respiratory insufficiency after being involved in an altercation. He underwent emergent cricothyroidotomy due to failed attempts to intubate following which he was transferred to the tertiary center for further management. Investigations with a CT angiography of the head and neck showed concerns for retropharyngeal hematoma. However, no active source of bleeding was noted on emergent neck exploration. Patient remained hemodynamically stable and underwent MR angiogram of head and neck next day, which revealed extracranial carotid artery aneurysm. A diagnostic cerebral angiogram was performed which revealed a 6.1 x 4.3 x 3.7 mm pseudoaneurysm arising from the right superior thyroid artery with no active extravasation.

Results:

Decision was made to manage the patient conservatively but due to recurrent oropharyngeal bleeding during the hospital stay resulting in hemodynamic instability, endovascular management was pursued eventually. Attempts to perform coil embolization failed due to stenosis of the ostium of the pseudoaneurysm. Embolization was therefore performed by injecting 0.5 cc of Onyx 18 (6% Ethylene Vinyl Alcohol Copolymer-- ev3, Irvine, CA, USA) resulting in complete obliteration of the aneurysm. Patient recovered completely without any recurrent bleeding or any other post-operative complications.

Conclusions:

Superior thyroid artery aneurysms are rare but can result in refractory bleeding and respiratory compromise. Symptomatic cases can be effectively and safely treated by endovascular strategies.

Keywords: Aneurysm Embolization, Onyx, Endovascular Therapy

Financial Disclosures: The authors had no disclosures.

Poster 33 & E-Poster 33

Mycotic Aneurysm Formation in a Patient with Granulomatosis with Polyangiitis and Alzheimer's Disease

Priya Nidamanuri, B.S.¹, Rahul Rao, M.D.²

¹Northeast Ohio Medical University, Rootstown, Ohio, USA; ²University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania, USA

Introduction:

Intracranial mycotic aneurysms are caused by infectious seeding and subsequent degeneration of the arterial wall. They are rarely seen in the absence of subacute bacterial endocarditis or systemic bacteremia. Few cases have documented an association between mycotic aneurysms and dental disease without evidence of bacteremia. This is a case of a ruptured mycotic aneurysm causing subarachnoid hemorrhage (SAH) in the setting of dental abscesses without systemic bacterial infection in a patient with Granulomatosis with Polyangiitis (GPA) and Alzheimer's disease.

Methods:

A 72 year-old woman with a history of severe periodontal disease, chronic sinusitis, spontaneous left frontal SAH two months prior to presentation, and progressive memory loss over the past two years presented with left hemiparesis and expressive aphasia. MRI brain revealed diffuse pachymeningeal enhancement, significant leptomeningeal enhancement in the right hemisphere, and a left frontal enhancing lesion.

Results:

Workup was notable for elevated CSF protein, CSF pleocytosis with lymphocytic predominance, and elevated serum c-ANCA. Cerebral angiogram revealed diffuse vasculopathy and a ruptured 1.4 x 1.6 mm mycotic aneurysm of the left anterior internal frontal artery that was embolized upon discovery. TTE, TEE, and blood cultures were unremarkable. Given the lack of evidence for active infection, it is likely that transient bacteremia secondary to the patient's dental abscesses led to mycotic aneurysm formation. The patient was diagnosed with limited GPA given her sinusitis, elevated c-ANCA, and lack of renal or pulmonary involvement. Ultimately, the patient had a brain and dural biopsy, which revealed cerebral amyloid angiopathy (CAA) consistent with advanced Alzheimer's disease.

Conclusions:

This patient had progressive memory loss from Alzheimer's disease, expressive aphasia from a ruptured left frontal mycotic aneurysm, and left hemiparesis from the right hemispheric leptomeningeal enhancement caused at least in part by meningeal amyloid angiopathy. The extent to which her GPA and CAA contributed to aneurysm formation remains unclear.

Keywords: Intracerebral Aneurysm, Ruptured, Pathophysiology, Inflammation, SAH

Financial Disclosures: The authors had no disclosures.

RESEARCH ABSTRACTS: PRIMARY CATEGORY – EMERGING THERAPIES

Poster 21 & E-Poster 21

A-novel approach of detecting CST-recovery using DTI-analysis, AFTER IA/MESENCHYMAL STEM/CELL INFUSION IN A CANINE STROKE-MODEL

Luis Guada, MD¹, Mitsuyoshi Watanabe, MD², Karen Bates, PhD², Dileep Yavagal, MD²

¹University of Miami/Jackson Memorial, Miami, Florida, USA; ²University of Miami, Miami, Florida, USA

Introduction:

Developing valid imaging biomarkers of stroke recovery are critical for translational-stroke research. Diffusion-Tensor-Imaging (DTI) assesses white matter microstructure in the brain and Diffusion-Tensortractography (DTT) for visual mapping of CST. Our data suggests a possible correlation between neurological recovery and the improvement in DTI/DTT.

Methods:

five Female Mongrel-Hound(n:3 MSCs, n:2 control saline only, aged 12-36-months). Reversible MCAstroke was induced using a detachable-coil(2x8mm) over 60min, permanent ACA occlusion(2x4 mmcoil). MSC (40 million/240cc) or saline/240 cc were infused IA, 48hrs post-stroke. Brain-MRIs were performed prior to IA infusion/post stroke, and 15- & 30-days post-stroke. DTT of the CST was generated. Weekly neurological score-evaluations were performed.

Results:

We observed a decreased of stroke vol and a qualitative increase in CST-caliber seen on DTT on the treated group, not seen in controls. Also, a faster neuro recovery was seen in the treated group in the 1st week not seen in the control group. It is important to mentioned that all dogs achieved recovery by 30 days close to baseline, but the difference was noticed at the speed of recovery seen on the treated-group.

Conclusions:

DTT imaging post IA-MSC therapy showed an increase of CST-caliber correlating with motor-recovery. These findings could support further development of DTI-DTT biomarkers to measure neurological-recovery in experimental models as well as in clinical-trials of stroke-therapies.

Keywords: Stem Cell Therapy, MRI, Endovascular Therapy

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS: PRIMARY CATEGORY - EMERGING THERAPIES

Poster 22 & E-Poster 22

Long Term Outcomes of Transverse Venous Sinus Stenting for Refractory Idiopathic Intracranial Hypertension.

<u>Ashish Kulhari, M.D.</u>¹, Amrinder Singh, M.D.¹, Rafia Jawed, M.D.¹, Zinal Vyas, M.D.¹, Siddhart Mehta, M.D.¹, Haralabos Zacharatos, M.D.¹, Jawad F Kirmani, M.D.¹

¹Hackensack Meridian JFK medical center, Edison, New Jersey, USA

Introduction:

Multiple case series have proven venous sinus stenting (VSS) to be very effective in medically refractory Idiopathic Intracranial Hypertension (IIH). The aim of this study is to share the long term outcomes of VSS in refractory IIH patients.

Methods:

Retrospective analysis of all patients with medically refractory IIH who underwent VSS at our university affiliated community comprehensive stroke center in 2017-2018 was done.

Results:

Our Neuroophthalmology services identified seven patients with medically refractory IIH. These patients underwent VSS or angioplasty. Mean age was 39. Eighty-five percent of patients were women (n=6).Mean body mass index (BMI) was 37 kg/m2. Headache was the most common symptom (85%, n=6) followed by transient visual obscurations (71%, n=5) and pulsatile tinnitus (57%; n=4). All patients had papilledema. Fifty seven percent of patients (n=4) had impaired visual field. Mean lumbar opening pressure was 40.6 cm H2O (SD= 9.66). All patients were on maximum doses of acetazolamide ± furosemide. 6 patients (85%) had dominant right transverse-sigmoid sinus. Four patients (57%) had severe right transverse ± sigmoid sinus stenosis and the rest (43%; n=3) had bilateral transverse sinus stenosis. Pre- stenting mean trans-stenosis pressure gradient was 18 mm Hg (SD=6.16). Six patients (85%) were treated with transverse sinus stenting and one (15%) with angioplasty only. Post-stenting mean trans-stenosis pressure gradient was 4.8 mm Hg (SD = 6.6). All patients were able to come off their medications with significant improvement in neurological and ophthalmological signs and symptoms post stenting (Mann-Whitney test; p value = 0.028). No procedure related complications occurred. At one or more year follow up, none of the patients had recurrence of symptoms. None of them required any pharmacological intervention. All the patients had stable neuro-ophthamological evaluation at one year.

Conclusions:

Long term outcomes of Transverse sinus stenting for medically refractory IIH are very promising.

Keywords: Intracranial Stenosis Stenting And Angioplasty

Financial Disclosures: The authors had no disclosures.

Poster 23 & E-Poster 23

Safety of Middle Meningeal Artery Embolization with Embospheres (100-300 μ m)

<u>Amrinder Singh, M.D.</u>¹, Ashish Kulhari, M.D.¹, Siddhart Mehta, M.D.¹, Daniel Ro, M.D.¹, Jawad F Kirmani, M.D.¹, Haralabos Zacharatos, M.D.¹

¹Hackensack Meridian JFK medical center, Edison, New Jersey, USA

Introduction:

Chronic subdural hematoma (SDH) has a high incidence of recurrence (2-37%) following surgical evacuation if the SDH membrane is not removed. Recently Middle Meningeal artery (MMA) embolization has emerged as a potential adjunct or alternative treatment for chronic SDH with durable results at resolving the SDH. Ischemic stroke, ipsilateral facial nerve palsy and ipsilateral vision loss/blindness are the potential complications of MMA embolization. There is also a theoretical risk of SDH expansion following embolization if the patient requires anticoagulation for appropriate clinical indications.

Methods:

Retrospective analysis of patients with chronic SDH who underwent MMA embolization at our Comprehensive Stroke center between April and August 2019 was done.

Results:

18 patients presented with chronic or acute on chronic SDH, 55% female. Mean age and modified Rankin score was 70 and 1, respectively. 17 patients (94%) required a total of 20 MMA embolizations. 83% had unilateral MMA embolization and 17% had bilateral MMA embolizations. There were no procedure related complications. 100-300 µm Embospheres was used for the MMA embolization in 82% of patient and 300-500 µm Embospheres in 18% of patients. 33% had surgical evacuation prior to the procedure. 44% received prophylactic embolization to prevent re-accumulation and 56% needed it to start anticoagulation. Anticoagulation and antiplatelets was started in 40% and 30% of eligible patients, respectively, following MMA embolization. The patient that did not receive MMA embolization had an MMA anatomy that precluded safe embolization. There was no case of SDH expansion with the initiation of anticoagulation or antiplatelets.

Conclusions:

MMA embolization for chronic subdural hematoma using the 100-300 μ m Embospheres is a safe procedure, that can be used as an adjunctive treatment following surgical evacuation to prevent recurrence or as a primary treatment of the subdural hematoma. Anticoagulation or antiplatelets can safely be resumed following embolization.

Keywords: Embolization

Financial Disclosures: The authors had no disclosures.

Poster 24 & E-Poster 24

Middle Meningeal Artery Embolization Technique using 100-300 µm Embospheres.

<u>Haralabos Zacharatos, M.D.</u>¹, Amrinder Singh, M.D.¹, Ashish Kulhari, M.D.¹, Farah Fourcand, M.D.¹, Jawad F Kirmani, M.D.¹, Siddhart Mehta, M.D.¹

¹Hackensack Meridian JFK medical center, Edison, New Jersey, USA

Introduction:

Embolization of the Middle Meningeal artery (MMA) ipsilateral to the chronic subdural hematoma (SDH) has been performed with polyvinyl alcohol particles (150-250 μ m), Embospheres (300-500 μ m), N-butyl-2-cyanoacrylate (NBCA), trisacryl gelatin microspheres (100-300 μ m) and liquid embolic agents, ONYX and SQUID. We describe the technique of using 100-300 μ m Embospheres (MeritMedical; South Jordan, Utah) for the MMA embolization.

Methods:

Under fluoroscopic guidance and roadmap technique, the microcatheter (minimum inner diameter of 0.0165 inches) selectively catheterizes the MMA and is positioned proximal to the bifurcation of the frontoparietal and squamosal/temporal arterial branches and distal to petrosal arterial branches that perfuse seventh cranial nerve. Microcatheter biplane angiography is performed to look for an orbital arterial branch that supplies collateral arterial blood supply to the ophthalmic artery. Each pre-packaged syringe contains 2 ml of Embosphere Microspheres in 7 ml of pyrogen-free, sterile, physiological saline. 8 ml of Visipaque 320 contrast is added to this pre-packaged syringe, resulting in an approximate 50% contrast and 50% microsphere/saline solution. A small air bubble is left within the 20 ml syringe and the syringe is attached to the luer lock three way stopcock. To evenly suspend the solution the syringe is gently inverted several times. 1 ml syringe is attached to the three way stopcock and filled with Embospheres. Under fluoroscopic and blank roadmap guidance, the Embospheres are administered in a slow pulsatile (gentle tapping) manner. The most important aspect of the embolization procedure is to visualize the antegrade movement of the Embospheres so that they distally penetrate the microcapillaries perfusing subdural hematoma membrane, carefully avoiding reflux.

Results:

Complete embolization of the frontoparietal and squamosal/temporal arterial branches of the MMA was achieved in all patients. No procedure related complications were noted.

Conclusions:

MMA embolization using 100-300 µm Embospheres is reproducible and safe.

Keywords: Embolization

Financial Disclosures: The authors had no disclosures.

Poster 25 & E-Poster 25

Radiographic Findings after Middle Meningeal Artery Embolization.

<u>Ashish Kulhari, M.D.¹</u>, Amrinder Singh, M.D.¹, Daniel Ro, M.D.¹, Haralabos Zacharatos, M.D.¹, Jawad F Kirmani, M.D.¹, Siddhart Mehta, M.D.¹

¹Hackensack Meridian JFK medical center, Edison, New Jersey, USA

Introduction:

Pathologic studies have demonstrated the membrane that surrounds the chronic subdural hematoma (SDH) has fragile microcapillaries that leak into the subdural space resulting in the recurrence of the SDH. Middle Meningeal artery (MMA) embolization has been demonstrated to be an alternative to surgical evacuation to prevent the recurrence and allow for the natural resorption of the SDH. The objective of this study is to grade the amount of SDH enhancement visualized on the head CT, performed within 24 hours of embolization, to assess the distal penetration of 100-300 µm Embospheres into the microcapillaries of SDH membrane.

Methods:

We retrospectively analyzed the patients with chronic or acute on chronic SDH who underwent MMA embolization from April – August 2019. All patients had CT head immediately or within 24 hours of the therapeutic intervention. We evaluated the CT head on the basis of the amount of contrast enhancement of the SDH and surrounding encapsulating membrane. SDH and membrane enhancement was divided into three groups: A) \leq 25%, B) 25-75%, C) \geq 75%.

Results:

17 patients underwent MMA embolization for acute on chronic or chronic SDH. SDH membrane enhancement of A) ≤25%, B) 25-75% and C) ≥ 75%. was noted in 23.5%, 29%, 47.5% patients respectively. 47% patients had 1 month follow up CT in which 75% belong to group C and 25% to group B. Mean size of SDH pre- embolization was 50 mm and 103 mm and 1 month post-embolization was 24 mm and 62 mm in Group B and C respectively. There was 62% reduction in the size of the SDH at month in Group C compared to a 52% reduction in Group B.

Conclusions:

Preliminary data suggests more distal penetration of the Embospheres into the microcapillaries of the SDH membrane leads to less recurrence and more resorption of SDH.

Keywords: Imaging

Financial Disclosures: The authors had no disclosures.

Poster 26 & E-Poster 26

Efficacy of Middle Meningeal Artery Embolization for Chronic Subdural Hematoma.

<u>Ashish Kulhari, M.D.¹</u>, Amrinder Singh, M.D.¹, Siddhart Mehta, M.D.¹, Farah Fourcand, M.D.¹, Jawad F Kirmani, M.D.¹, Haralabos Zacharatos, M.D.¹

¹Hackensack Meridian JFK medical center, Edison, New Jersey, USA

Introduction:

Symptomatic chronic subdural hematoma (SDH) is treated with surgical evacuation. SDH has a high incidence of recurrence despite evacuation, reported between 2% and 37%. Middle Meningeal artery (MMA) embolization has emerged as potential adjunct or alternative treatment for these patients.

Methods:

Retrospective analysis of patients with chronic SDH who underwent MMA embolization at our Comprehensive Stroke center between April and August 2019 was done.

Results:

18 patients presented with chronic SDH, 55% female. Mean age and modified Rankin score was 70 and 1, respectively. 17 patients (94%) required a total of 20 MMA embolizations. 83% had unilateral and 17% had bilateral MMA embolizations. 100-300 µm Embospheres were used in 82% of the patients and 300-500 µm Embospheres in 18% of the patients. 33% patients had Burr hole prior to the procedure. 5% (n= 1) patient had Burr hole evacuation after embolization due to Neurosurgeon preference, not neurological deterioration. 56 % patients received treatment to resume anticoagulation/antiplatelet and 44% received prophylactic embolization to prevent reaccumulation after Burr hole evacuation. Mean size of maximum diameter of SDH and midline shift was 16.9 mm and 4.6 mm respectively on admission CT. Mean SDH size and midline shift at discharge was 13 mm and 2.27 respectively. 50% patients had 1 month follow up CT with mean SDH size of 8.2 mm. 17 % (n=3) patients had complete resolution on 3 month follow up. One patient treated with 300-500 µm Embospheres had an acute on chronic asymptomatic SDH on 1 month follow up CT, requiring accessory meningeal artery embolization with 100-300 µm Embospheres ultimately resulting complete resolution of the SDH at 1 month post embolization.

Conclusions:

MMA embolization using 100-300 μ m Embospheres leads to reproducible results to prevent recurrence of chronic subdural hematoma. Large prospective randomized trials are needed to verify our results.

Keywords: Embolization

Financial Disclosures: The authors had no disclosures.

Poster 27 & E-Poster 27 Safety and Efficacy of Intravenous Cangrelor as Antiplatelet Premedication for Acute Neuroendovascular Procedures

Daniel Vela-Duarte, MD, MSCR¹, Kaushik Ravipati, MS², Amy K Starosciak, PhD³, Dennys Reyes, MD¹, Guilherme Dabus, MD, MBA¹, Italo Linfante, MD¹

¹Miami Cardiac & Vascular Institute. Neuroscience Center, Baptist Hospital of Miami, Miami, Florida, USA; ²Herbert Wertheim College of Medicine, Florida International University, Miami, Florida, USA; ³Neuroscience Center, Baptist Hospital of Miami, Miami, Florida, USA

Introduction:

Oral antiplatelet therapy has been used effectively to prevent thromboembolic events during stentassisted coiling, deployment of flow-diverters and acute stroke stenting. Intravenous (IV) cangrelor is a selective P2Y12 inhibitor with a rapid onset of action and short plasma half-life. Our aim was to evaluate the feasibility and safety of IV cangrelor in conjunction with oral ticagrelor as an antiplatelet strategy in the setting of acute neuroendovascular procedures.

Methods:

We conducted a database retrospective analysis of patients with aneurysmal subarachnoid hemorrhage (aSAH) and acute stroke stenting for acute internal carotid artery occlusion treated with IV cangrelor and ticagrelor as an adjunct therapy. Treatment-related complications (minor/major hemorrhage, stroke) as well as clinical outcomes were analyzed

Results:

From 2018 to present we treated 10 patients. Mean age was 62 years (40-88). Six patients were male (60%). Median length of stay was 9.5 days (3-18). Five patients presented with stroke and middle cerebral artery (MCA) occlusion. Three of five patients had a carotid stent placed for MCA-ICA tandem occlusion and one had an intracranial stent deployed in the MCA. NIHSS for patients with stroke was 13 (range 7–17). Four patients presented with aSAH due to ruptured cerebral aneurysms. 2 patients were treated with endovascular embolization with pipeline embolization device and 2 with stent-assisted coiling. One patient was treated for an unruptured vertebral artery dissecting aneurysm with flow diversion. None of the patients experienced intraprocedural thromboembolic complications, or in-stent thrombosis within 24 hours after the intervention. One patient developed a small subdural hematoma, one developed intraventricular extension of aSAH. and one had transient GI bleeding. No thrombotic or bleeding events were attributed to cangrelor use. Eight patients had a good clinical outcome (mRS 0-2) and two expired.

Conclusions:

In our preliminary experience, IV cangrelor is feasible and safe in preventing thromboembolic event in acute neuroendovascular procedures.

Keywords: Antiplatelet, Subarachnoid Hemorrhage, Flow Diverter, Aneurysm Embolization, Carotid Stenting And Angioplasty

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS: PRIMARY CATEGORY - IMAGING

Poster 28 & E-Poster 28 Referral Center Vascular Imaging Improves the Rate of Thrombectomy Morgan L Boyer, MPH, RN, CNRN, SCRN, CTC¹

¹Commonwealth Health Wilkes-Barre General Hospital, Wilkes-Barre, Pennsylvania, USA

Introduction:

It has been estimated that 24 per 100,000 person-years has an acute large vessel occlusion (LVO) ischemic stroke. This translates to an estimated 38 patients presenting annually to one primary stroke center. Representing 10% of the ischemic stroke population, optimizing patient transfer selection to a thrombectomy capable stroke center (TSC) is crucial for retention while not burdening the TSC with futile transfers.

Methods:

A real-world analysis of suspected LVO patients transferred for intervention was reviewed. Patients receiving a non-contrast head CT, a CT angiogram (CTA), or CTA and cerebral perfusion (CTP) were compared for successful mechanical intervention. Success was defined as any procedural attempt. Failure was defined as no mechanical intervention due to lack of large vessel occlusion and/or unfavorable imaging correlate.

Results:

The total patient review consisted of 35 patients. When a non-contrast head CT alone was performed, only 11% of patient received a thrombectomy. In comparison, 63% of CTA only and 66% of CTA with CTP had a successful thrombectomy. Advanced imaging significantly improved the chances of receiving a thrombectomy independent of CTA alone or CTA with CTP (X^2 (2, N = 35) = 10.79, p = .004544).

Conclusions:

Real world analysis demonstrates advanced imaging, at minimum a CTA, obtained at the referring stroke center increases the likelihood of thrombectomy to 2 out of every 3 patients transferred. Considering the time sensitive nature of stroke, adoption of advanced imaging immediately after the non-contrast head CT should be encouraged. While this review is limited by sample size, the success demonstrated by one hospital's innovation drives administrative and medical leadership support of process improvement.

Keywords: Angiographic Ct, Acute Ischemic Stroke Intervention, Angiographic Ct Perfusion, Imaging, Mechanical Thrombectomy

Financial Disclosures: The authors had no disclosures.

Poster 29 & E-Poster 29

Asymptomatic Dolichoectasia of Bilateral Anterior Cerebral Arteries

Marion J Oliver, MD¹, Angelique M Manasseh, Medical Student², Paul A Mazaris, MD¹

¹Spectrum Health, Grand Rapids, Michigan, USA; ²Michigan State University, Lansing, Michigan, USA

Introduction:

To describe a case of asymptomatic anterior cerebral artery dolichoectasia.

Methods:

Intracranial dolichoectasia can be defined as an increase in the diameter, length and tortuosity of the blood vessel. The prevalence of intracranial dolichoectasia has been estimated to be 0.08-6.5% in the general population and 3-17% in patients with a history of stroke. This entity is well described and primary affects the posterior circulation, specifically the vertebral and basilar arteries. The prevalence and incidence of dolichoectasia in the anterior circulation is unknown, is extremely rare and very few published case reports exist. The pathophysiology of intracranial dolichoectasia has been characterized by disruption of the internal elastic lamina, atrophic smooth muscle of the tunica media, hyalinized connective tissue and increased activity of matrix metalloproteinases. Risk factors for sporadic intracranial dolichoectasia are similar to those of more traditional vascular disease such as hypertension, male gender and advanced age. Finally, various hereditary disorders, connective tissue disorders and infections make people more susceptible to the development of intracranial dolichoectasia.

Results:

30 year old female presented to her primary care physician with chief concern for recurrent bilateral ear infections. She had no other symptoms Head CT with contrast, MRI brain with and without contrast both suggested frontal arterial venous malformation. Diagnostic cerebral angiography showed bilateral dolichoectasia of the anterior cerebral arteries with extremely delayed filling

Conclusions:

There is only one documented case of asymptomatic dolichoectasia of the anterior cerebral arteries, and similar to our case, the patient was a young adult female. However, the authors noted possible evidence of old cerebral infarction or selective neuronal loss on imaging. Our patient had no other neuroradiological findings.

Keywords: Angiogram, Diagnostic Neuroradiology, Vascular Imaging, Imaging

Financial Disclosures: The authors had no disclosures.

Poster 30 & E-Poster 30

Transcranial Doppler CO2 Reactivity: Threshold for Clinical Significance in Patients with Vascular Risk Factors

<u>Robert W Regenhardt, MD, PhD</u>¹, Neal M Nolan, MD¹, Alvin S Das, MD¹, Andrew D Monk, RVT², Sarah L Michaud, RVT², Henrikas Vaitkevicius, MD²

¹Massachusetts General Hospital, Brigham and Women's Hospital, Boston, USA; ²Brigham and Women's Hospital, Boston, USA

Introduction:

Thresholds for abnormal transcranial Doppler cerebrovascular reactivity (CVR) studies are poorly understood, especially for patients with multiple vascular risk factors. Using a real-world cohort of patients with unilateral stenosis, we sought to describe a clinically significant threshold for CO2 reactivity (CO2R).

Methods:

CVR studies from 2017-2019 were completed with patients hyperventilating (HV), breathing room air normally (RA), and 8% CO2. The mean and standard deviation (SD) of CO2R (%change in MFV from HV to RA to 8% CO2 / mmHg change in end tidal CO2; calculated by slope of line from 3 points / mean velocity of points x 100%) for the unaffected side was calculated; 2 SD below the mean was considered significant. ROC curves for both sides were evaluated for sensitivity (Sn) and specificity (Sp).

Results:

133 consecutive CVR studies were performed on 62 patients. Unilateral vessel stenosis <2mm (mean 0.47mm, 52% occluded) was identified by CTA/MRA in 67. Of these, 58% had left-sided disease, 59% were female, and mean age was 55+/-16 years. Comorbidities included hypertension (60%), hyperlipidemia (62%), diabetes (15%), CAD (22%), prior stroke/TIA (40%), and smoking (35%). For the unaffected side, mean CO2R was 1.86+/-0.53, defining significant <0.80. For the affected side, mean CO2R was 1.27+/-0.90 (29% significantly low). ROC curves for this threshold predicted abnormal acetazolamide SPECT (AUC=0.78, p=0.007, Sn=0.73, Sp=0.79), perfusion abnormality (AUC=0.68, p=0.002, Sn=0.42, Sp=0.77), infarction on MRI (AUC=0.69, p<0.0001, Sn=0.45, Sp=0.76), and blood pressure dependent neurologic exam (AUC=0.63, p=0.036, Sn=0.50, Sp=0.76).

Conclusions:

In patients with multiple vascular risk factors, a reasonable threshold for clinically significant CO2R is <0.80. Given at-risk patients are often identified before CVR, Sp may be prioritized to confirm high risk. While no study should be interpreted in isolation, noninvasive CVR may aid in diagnosing and risk stratifying patients with stenosis/occlusion for revascularization.

Keywords: Transcranial Doppler, Ultrasound, Atherosclerosis, Intra Caranial Stenosis, Extracranial Stenosis

Financial Disclosures: The authors had no disclosures.

Grant Support: RWR is supported by NIH R25 NS065743.

Poster 31 & E-Poster 31

Improved Efficiency With Radial Access For Diagnostic Cerebral Angiography At A Comprehensive Stroke Center

<u>Ahmed E Kenawy, Undergraduate Student</u>¹, Wondwossen G Tekle, MD², Ameer E Hassan, DO, FAHA, FSVIN²

¹Florida State University, Tallahassee, Florida, USA; ²UTRGV - Valley Baptist Medical Center, Harlingen, Texas, USA

Introduction:

Radial Artery Catheterization has been newly incorporated into the field of Endovascular Surgical Neuroradiology as a safer and more efficient method for Cerebral Angiography as opposed to the Femoral artery approach. The objective is to understand the relationship between cerebral angiography procedure times after an operator has converted to a radial first approach.

Methods:

A retrospective analysis was conducted from January to August of 2019 to compare procedural times for femoral and radial artery approaches. This was conducted by comparing different procedural specifications such as total procedural time, fluoro time, and amount of contrast used.

Results:

The average age of the 434 patients in the analysis was 63.9 years with a range between 21 and 96 years. 183 patients (mean fluoro time 7.55, 95% confidence interval 7.03-8.08) underwent successful diagnostic cerebral angiographies through the radial artery and 251 patients through the femoral approach. The first two months of the radial approach saw an average fluoro time of 11.23 min. In the last two months of the study, the fluoro time plateaued to an average of 6.73 minutes after 55 cases. Compared to the radial approach, the average fluoro time for the femoral approach during the eightmonth study was about 4.9 min with insignificant fluctuation during this time period. Additionally, in the first two months the average procedure time with radial approach was an average of 33 minutes. By the last two months the average procedural time was reduced to 21 minutes. Angiography with the femoral approach took an average of 16 minutes during the study period.

Conclusions:

Transradial procedural time and fluoro time continued to improve until about 55 cases, but did not reach the peak efficiency of the femoral approach. Further advances in catheter technology are needed to continue to improve radial artery diagnostic cerebral angiography.

Keywords: Angiogram, Access Catheters, Vascular Imaging

Financial Disclosures: The authors had no disclosures.

Poster 32 & E-Poster 32

Prevalence of Classic Renal and Craniocervical Artery Fibromuscular Dysplasia In Patients with Carotid Web

<u>Alhamza R Al-Bayati, MD¹</u>, Raul G Nogueira, MD¹, Nirav R Bhatt, MD¹, Michael Frankel, MD¹, Fadi Nahab, MD¹, Catarina Perry da Câmara, MD², Diogo C Haussen, MD¹

¹Emory University School Of Medicine/ Grady Memorial Hospital, Atlanta, Georgia, USA; ²Grady Memorial Hospital, Atlanta, Georgia, USA

Introduction:

Carotid Web (CaW) has been increasingly recognized as a cause of recurrent ischemic stroke. CaW is a form of fibromuscular dysplasia (FMD) described as an abnormal shelf-like projection of predominantly intimal fibrous tissue into the carotid bulb. It is often overlooked as a pathological entity and dismissed if no coexistent signs of classic FMD changes are observed. We aim to evaluate the frequency of classic FMD in high-yield vascular territories (craniocervical and renal arteries) within patients with symptomatic CaW.

Methods:

This was a retrospective analysis of local/comprehensive stroke center symptomatic CaW database (September 2014 – July 2019). All webs were diagnosed by CT angiography (CTA), independently reviewed by two raters blinded to the clinical information and laterality of the stroke/TIA followed by a consensus read. Symptomatic CaW was defined by a negative stroke work-up per best practice for embolic strokes of undetermined source (ESUS). Cases with more than one potential stroke etiology were included. All CTAs and available digital subtraction angiograms (DSA) were reviewed in maximum intensity projections (coronal, sagittal and axial views) for evidence of classic fibromuscular dysplasia involving the vertebral or carotid arteries. Patients that had catheter angiography were evaluated for evidence of coexistence of classic fibromuscular dysplasia involving the renal arteries.

Results:

55 patients were identified. Median age was 51 [IQR 42-59] years and 75% were women. All patients had CTA and 36 patients also had DSA. Internal carotid artery (ICA) classic FMD changes were noted in only 5/55 (9 %) in the ipsilateral carotids. No contralateral carotid or vertebral artery classic FMD changes were observed. Renal artery catheter based angiography was obtained in 11 patients/22 renal arteries, and no coexistent classic FMD changes were detected.

Conclusions:

CaW phenotype is rarely associated with classic FMD changes. Coexistent classic FMD is not a useful marker to indicate CaW diagnosis.

Keywords: Carotid, Vertebral, Angiogram

Financial Disclosures: The authors had no disclosures.
CLINICAL ABSTRACTS: PRIMARY CATEGORY - INTRACRANIAL ANEURYSM

Poster 35 & E-Poster 35

Validation of Surgical Theatre [®] in Evaluating residual Aneurysm After Coiling.

<u>Farah Fourcand, M.D.</u>¹, Ashish Kulhari, M.D.¹, Amrinder Singh, M.D.¹, Daniel Ro, M.D.¹, Azka Shaikh, M.D.¹, Daniela Barbery, Program lead¹, Thomas Steineke, M.D.¹, Haralabos Zacharatos, M.D.¹, Jawad F Kirmani, M.D.¹, Siddhart Mehta, M.D.¹

¹Hackensack Meridian JFK medical center, Edison, New Jersey, USA

Introduction:

After aneurysmal coiling there is an acute phase of thrombus formation with active inflammation and a chronic phase of neointimal growth across the aneurysmal neck. DSA is the gold standard imaging technique to quantify residual aneurysm filling. The aim of this study is to determine if the virtual reality (VR) reconstruction adds value to digital subtraction angiography (DSA) and CT angiography (CTA) in the evaluation of residual aneurysm after coiling.

Methods:

Reconstructions with 360° VR using volumetric DSA scans of 15 unruptured intracranial aneurysms treated with coil embolization from June 2013 to January 2018 at our university affiliated community based comprehensive stroke center were built using Surgical Theatre[®]. Each VR model was compared with their DSA and CTA. Four neurointerventionalists evaluated residual aneurysm filling in each case using modified Raymond Roy scale. Data analysis was performed using chi-square test with an alpha level of p=<0.05.

Results:

Residual aneurysm was visualized in 40 % (n=6) VR model, 40% (n=6) DSA and 13 % (n=2) CTA based on modified Raymond Roy score.

Conclusions:

Surgical Theatre [®] VR model could be used as an adjunctive tool to DSA or CTA for visualization of residual aneurysm. Larger prospective studies are warranted to validate our results.

Keywords: Aneurysm, Coiling, Imaging

Financial Disclosures: The authors had no disclosures.

Poster 36 & E-Poster 36

Does Virtual Reality add value to DSA in analyzing aneurysms post Pipeline™, Coiling and Clipping. <u>Farah Fourcand, M.D.</u>¹, Daniela Barbery, Program lead¹, Ashish Kulhari, M.D.¹, Azka Shaikh, M.D.¹, Amrinder Singh, M.D.¹, Daniel Ro, M.D.¹, Thomas Steineke, M.D.¹, Siddhart Mehta, M.D.¹, Jawad F Kirmani, M.D.¹, Haralabos Zacharatos, M.D.¹

¹Hackensack Meridian JFK medical center, Edison, New Jersey, USA

Introduction:

Digital subtraction angiography (DSA) is considered gold standard imaging modality for evaluating residual aneurysm, contrast stasis, stent structure, endoleak and branch filling post endovascular or open surgical aneurysm treatment. Virtual reality (VR) models can be reconstructed from DSA images. In this study, we want to determine if VR reconstruction adds value to DSA in the evaluation of aneurysms following flow diversion, coiling and microsurgical clipping.

Methods:

Reconstructions with 360° VR of intracranial aneurysms with available DSA treated with Pipeline[™] (n=50), endovascular coiling (n=15), and microsurgical clipping (n=10) from March 2010 to September 2018 at our comprehensive stroke center were built using Surgical Theatre[®]. Each VR model was compared with their DSA. Four neurointerventionalists evaluated Pipeline cases for residual aneurysm, contrast stasis, endoleak, free-hanging stent edges with and without thrombus, in-stent stenosis and branch filling; coiling and clipping cases for residual aneurysm using modified Raymond Roy scale.

Results:

Among 50 Pipeline[™] cases, VR model identified free hanging stent edge in 5 cases, not seen with DSA. In seven cases, complete branch filling was visualized on DSA but not with VR model. In one case, VR model was able to better evaluate in-stent stenosis than DSA. There was no difference in the evaluation of residual aneurysmal filling and presence of endoleak in VR model compared to DSA. Stasis phase could not be assessed in VR Model. Among 15 coiling cases, residual aneurysm was visualized in 40 % (n=6) VR model and 40% (n=6) DSA. Among 10 surgical clipping cases, VR model detected residual aneurysm filling in 2 cases as compared to DSA.

Conclusions:

Surgical Theatre[®] is an effective software-enhancement tool that adds value to digital subtraction angiography (DSA) in the evaluation of aneurysms following flow diversion stenting, endovascular coiling, and microsurgical clipping. Larger prospective trials are warranted to validate our results.

Keywords: Aneurysm

Financial Disclosures: The authors had no disclosures.

Poster 37 & E-Poster 37

Validation of Surgical Theatre[®] in Evaluating Aneurysms After Pipeline[™] Flow Diversion.

<u>Farah Fourcand, M.D.</u>¹, Ashish Kulhari, M.D.¹, Amrinder Singh, M.D.¹, Azka Shaikh, M.D.¹, Daniela Barbery, M.D.¹, Daniel Ro, M.D.¹, Thomas Steineke, M.D.¹, Haralabos Zacharatos, M.D.¹, Siddhart Mehta, M.D.¹, Jawad F Kirmani, M.D.¹

¹Hackensack Meridian JFK medical center, Edison, New Jersey, USA

Introduction:

Digital subtraction angiography (DSA) is considered goal standard to evaluate aneurysms after flow diversion. Virtual Reality (VR) reconstruction using Surgical Theatre[®] constructs a model based on the DSA or CT Angiography (CTA). Our study's objective is to determine if the VR reconstruction adds value to DSA and CTA in the evaluation of aneurysms after flow diversion.

Methods:

Reconstructions with 360° VR using DSA scans of unruptured wide-neck intracranial aneurysms with available DSA and CTA treated with Pipeline[™] from March 2010 to May 2018 were built using Surgical Theatre[®]. Each VR model was compared with their DSA and CTA. Four institutional neurointerventionalists evaluated each case using parameters including residual aneurysmal filling, intra-aneurysmal contrast stasis, endoleak, free-hanging stent edge with and without thrombus, in-stent stenosis, and branch filling.

Results:

Fifty out of 86 Pipeline[™] cases had 3D rotational DSA and technical parameters required to build a VR model. Cases comprised of 98% anterior circulation and 2% posterior circulation aneurysms. In five cases, VR model was able to identify free hanging stent edge, not seen with DSA or CTA. In seven cases, DSA and CTA was able to visualize complete branch filling, not identified with VR model. In one case, VR model was able to better evaluate in-stent stenosis than DSA and CTA. There was no difference in the evaluation of residual aneurysmal filling and presence of endoleak in VR model compared to DSA and CTA. Stasis phase could not be assessed in VR Model or CTA.

Conclusions:

Surgical Theatre[®] virtual reality reconstruction enhances the ability to evaluate stent structure and endoluminal stent alignment. It is more sensitive than DSA or CTA in evaluating free-hanging edges with and without thrombus and in-stent stenosis. Larger prospective studies are warranted to validate our results.

Keywords: Aneurysm

Financial Disclosures: The authors had no disclosures.

Poster 38 & E-Poster 38

HEAT Grading Scale as a Neurovascular Remodeling Based Score in Aneurysms Treated with Flow Diversion

Jawad F Kirmani, M.D.¹, Farah Fourcand, M.D.¹, Ashish Kulhari, M.D.¹, Amrinder Singh, M.D.¹, Daniel Ro, M.D.¹, Daniela Barbery, Program lead¹, Azka Shaikh, M.D.¹, Haralabos Zacharatos, M.D.¹, Thomas Steineke, M.D.¹, Siddhart Mehta, M.D.¹

¹Hackensack Meridian JFK medical center, Edison, New Jersey, USA

Introduction:

The goal of flow diversion is to isolate an aneurysm from circulation though endothelialization of the aneurysmal neck and hemodynamic induction of intra-aneurysmal thrombosis. Current grading scales do not include the above parameters to evaluate aneurysms after flow diversion. Our study applied the principles of neurovascular remodeling in the classification of flow diverted aneurysms to predict outcomes using the HEAT (Hemodynamics, Endothelialization and Aneurysmal Thrombosis) grading scale.

Methods:

Reconstructions with 360° Virtual reality (VR) using digital subtraction angiography (DSA) scans of unruptured wide-neck intracranial aneurysms treated with Pipeline[™] from March 2010 to May 2018 were built using Surgical Theatre[®]. The HEAT scale was used to generate a 0 to 15-point ordinal score that evaluated residual aneurysmal filling (none 0%, entry remnant 95%), contrast stasis (persistent contrast at venous phase, clearance before venous phase, arterial clearance before capillary phase), endoleak (absence, presence), free-hanging stent edge with and without thrombus edge (absent, present without thrombus, present with thrombus), in-stent stenosis (0-29% minimal, 30-49% mild, 50-69% moderate, 70-94% severe, 95-99% critical), and branch filling based on thrombolysis in cerebral infarction criteria (complete, partial TICI 2b >50%, partial TICI 2a <50%, insufficient). Each case was assigned a HEAT score by four neurointerventionalists using DSA, CTA, and VR model.

Results:

Fifty out of 86 Pipeline[™] cases had 3D rotational DSA and technical parameters required to build a VR model. Clinical adverse events including central retinal artery occlusion, middle cerebral artery syndrome, and amaurosis fugax were positively associated with increased HEAT score (p=<0.001). HEAT score was positively associated with subclinical adverse events including endoleak (n=2) and free-hanging edge with thrombus (n=2) (p=<0.001). Interrater reliability was high (k = 0.8).

Conclusions:

The HEAT grading scale is sensitive, reproducible, and associated with clinical outcome. Larger prospective studies are warranted to validate our results.

Keywords: Aneurysm

Financial Disclosures: The authors had no disclosures.

Poster 39 & E-Poster 39

Validation of Surgical Theatre® in Evaluating Aneurysms After Clipping.

<u>Azka Shaikh, M.D.</u>¹, Daniela Barbery, Program Lead¹, Ashish Kulhari, M.D.¹, Farah Fourcand, M.D.¹, Amrinder Singh, M.D.¹, Daniel Ro, M.D.¹, Haralabos Zacharatos, M.D.¹, Siddhart Mehta, M.D.¹, Jawad F Kirmani, M.D.¹, Thomas Steineke, M.D.¹

¹Hackensack Meridian JFK medical center, Edison, New Jersey, USA

Introduction:

DSA is considered the gold standard for evaluation of aneurysms after microsurgical clipping. Clip and bone artifacts are biggest limiting factors in analysis of aneurysms post clipping. Virtual reality (VR) software like Surgical TheatreTM are gaining popularity within neurosurgery field for peri-operative planning and intra-operative navigation. VR reconstructions can be obtained from digital subtraction angiography (DSA) or CT angiography (CTA). The objective of our study was to determine if the 360° VR reconstruction adds value to DSA and CTA in the evaluation of aneurysms after microsurgical clipping.

Methods:

Reconstructions with 360° VR using volumetric DSA scans of unruptured intracranial aneurysms treated with clipping from March 2010 to May 2018 at our university affiliated community based comprehensive stroke center were built using Surgical Theatre[®]. Each VR model was compared with their DSA and CTA. Four institutional neurointerventionalists evaluated each case using modified Raymond Roy and Meyer scales to measure residual filling of aneurysm. Data analysis was performed using chi-square test with an alpha level of p=<0.05.

Results:

Ten out of 39 clippings had 3D rotational DSA and technical parameters required to build a VR model. Seven aneurysms were located in anterior circulation and 3 were located in posterior circulation. VR model, DSA, and CTA provided consistent residual filling of aneurysm in 8 cases. VR model was more sensitive in detecting residual filling of aneurysm in 2 cases as compared to DSA and CTA.

Conclusions:

Surgical Theatre[®] virtual reality reconstruction identifies subtle volumetric changes representative of the degree of aneurysmal filling after clipping as compared to DSA and CTA which could be of value in analysis of aneurysms after microsurgical clipping. Larger prospective studies are warranted to validate our results.

Keywords: Aneurysm, Clipping

Financial Disclosures: The authors had no disclosures.

Poster 34 & E-Poster 34

Primary Wind Diameter of Neurovascular Embolic Coils Influences Packing Density and Case Costs <u>Ramesh Grandhi, MD, M.Sc.¹, Emilie Kottenmeier, M.Sc.², Heather L Cameron, Ph.D.³, Sarah T Kane, Ph.D.³</u>

¹University of Utah, Salt Lake City, Utah, USA; ²CERENOVUS (Johnson & Johnson), Irvine, California, USA; ³Cornerstone Research Group, Burlington, Canada

Introduction:

Endovascular coiling is a common treatment modality for intracranial aneurysms. Increasing aneurysm packing density (PD) >24% is associated with reduced recanalization. PD can be increased by inserting additional or larger volume coils. An analysis was conducted to assess the impact of primary wind diameter (D_2) on PD, and total cost (TC).

Methods:

In this analysis, a hypothetical aneurysm (volume: 157.5mm³{a}) was filled with two sets of coils with equal lengths and varied D₂ (0.010" vs. 0.012"). Unit cost per coil was assumed equal (USD \$1,429{a}). PD was calculated as [(Total coil volume/aneurysm volume)(100%)]{b}. Individual coil volumes were calculated using the formula $[\pi(D_2/2)^2(\text{Length})]$ {c}. In "Scenario 1", the PD achieved with seven coils of lengths: (1) 20cm; (2) 15cm; (3) 10cm; (4) 8cm; (5) 8cm; (6) 8cm; (7) 6cm was compared for coils with D₂=0.010" vs. D₂=0.012". In "Scenario 2", the number of D₂=0.010" vs. D₂=0.012" coils required to achieve a PD >24% was analyzed using the same set of coils per Scenario 1.

Results:

In Scenario 1, filling with $D_2=0.010''$ coils resulted in a PD of 24%, whereas $D_2=0.012''$ coils resulted in a PD of 35%. The TC for either coil set was \$10,003, but PD was higher with the $D_2=0.012''$ coils. In Scenario 2, achieving a PD >24% required seven $D_2=0.010''$ coils and only four $D_2=0.012''$ coils. The cost-savings of inserting three fewer coils was \$4,287/patient and \$428,700 in a 100-patient cohort.

Conclusions:

Primary wind diameter influences PD, TC, and the number of coils needed to achieve a PD >24%. Compared to $D_2=0.010''$ coils, $D_2=0.012''$ coils were estimated to achieve higher PD for the same TC and required fewer coils to achieve a PD greater than 24%. Using $D_2=0.012''$ coils may provide cost and procedural efficiencies by limiting the number of coils required to achieve an aneurysm PD with reduced recanalization risk.

Keywords: Coiling, Health Economic, Aneurysm Embolization, Endovascular Therapy

Financial Disclosures: Consultant for CERENOVUS (Johnson & Johnson). Consultant for Medtronic Neurovascular. Consultant for Balt Neurovascular.

Poster 40 & E-Poster 40

Trends in Real-World Outcomes Associated With The Use of Enterprise Stent for Unruptured Intracranial Aneurysms

<u>Reade De Leacy, Dr.</u>¹, Emilie Kottenmeier, Ms.², Stephanie Lee, Mrs.³, Iftekhar Kalsekar, Mr⁴, Sidharth M, Mr⁵, Rahul Khanna, Mr.⁴, Alejandro M Spiotta, Dr.⁶

¹Mount Sinai Hospital, Department of Neurosurgery, New York City, New York, USA; ²Johnson & Johnson Medical Devices, Franchise Health Economics and Market Access, Irvine, California, USA; ³Johnson and Johnson Medical Devices, Asia Pacific, Singapore, Singapore; ⁴Medical Device Epidemiology, Johnson and Johnson, New Brunswick, New Jersey, USA; ⁵Mu Sigma Inc, Bangalore, India; ⁶Medical University of South Carolina, Department of Neurosurgery, Charleston, South Carolina, USA

Introduction:

Endovascular coiling is an effective and less-invasive treatment procedure for unruptured intracranial aneurysm (UIA). This study aimed to assess trends in outcomes associated with the use of Enterprise[®] stent-assisted endovascular coiling among UIA patients.

Methods:

Using the 2011-2017 Premier Healthcare Database[®] (PHD), UIA patients aged ≥18 years undergoing stent-assisted endovascular coiling procedure were identified. Outcomes including discharge status, length of stay (LOS), complications, and 90-day inpatient readmission (all-cause and UIA-related) were assessed. A generalized estimating equation (GEE) with log-link and negative binomial distribution was used to assess the yearly trend in LOS, and survey logistic regression was used to examine the yearly trend in discharge status (discharge to home/home health), complications, and readmission. Regression analyses adjusted for study covariates including patient demographic and comorbidity characteristics, and hospital characteristics. In addition, clustering effect of hospitals was adjusted.

Results:

590 UIA patients who underwent stent-assisted endovascular coiling were identified. The mean age was 60.11 years, and almost 77% were female and white. A significant decrease in LOS occurred between 2011 and 2014, with LOS being ~24% lower in 2014 (exponentiated ratio [ER]: 0.76; 95% confidence interval [CI]: 0.60-0.94, P<0.05). The occurrence of overall complications decreased by 79% between 2011 and 2017 (odds ratio [OR]: 0.21; 95% CI: 0.02-1.68). A significant decrease in 90-day all-cause inpatient readmission was observed between 2011 and 2017 (OR: 0.23; 95% CI: 0.07-0.79, P < 0.05), while the UIA-related readmission decreased significantly between 2011 and 2014 (OR: 0.15; 95% CI: 0.03-0.77). No significant decrease in discharge to home was observed.

Conclusions:

Significant improvements in outcomes including LOS, complications, and readmission among UIA patients undergoing stent-assisted coiling was observed during the study period.

Keywords: Aneurysm, Endovascular, Endovascular Therapy, Enterprise

Financial Disclosures: Dr. De Leacy is a consultant to Cerenovus, a Johnson & Johnson company, Siemens, and Imperative Care.

Grant Support: This study was funded by Cerenovus.

Poster 41 & E-Poster 41

Pipeline Embolization in the Treatment of Posterior Circulation Aneurysm: A Meta-analysis <u>Chintan Rupareliya, MD, MHA¹</u>, Chenyu Liu, MS², Qian Yu, BS¹

¹University of Kentucky, Lexington, Kentucky, USA; ²Ben May Department of Cancer Research, University of Chicago, Chicago, USA

Introduction:

The Pipeline Embolization Device, also known as flow diverter, has been proven to be effective in treating intracranial aneurysms. Although ample evidence has shown its efficacy in obliterating anterior circulation aneurysms proximal to the internal carotid arteries, its application for aneurysm in the posterior circulation is debatable due to the concern of occluding collaterals supplying the brain stem. In this meta-analysis, our goal is to evaluate the safety and efficacy of the Pipeline Embolization Device in the treatment of posterior circulation aneurysm.

Methods:

PubMed database was searched for publications from establishment to July 2019. The following keywords were used: "posterior circulation", "aneurysm", "pipeline", "embolization". The following variables were investigated: Study's baseline characteristics, aneurysm type, aneurysm location, complete occlusion rate, and post-procedural ischemia rate. Statistical analysis was performed with STATA 16.1 (STATA Corp., College Station, TX, USA).

Results:

Twenty-four studies of 896 patients and 885 aneurysms were included in our meta-analysis. The mean imaging follow-up lengths ranged from 6.8 to 21.1 months. Based on aneurysm type, the percentages of saccular, fusiform and dissecting aneurysms were 50.4%, 33.9%, and 15.6%. The most common three posterior aneurysm locations were vertebral artery (36.8%), basilar artery (21.3%), and posterior inferior cerebellar artery (17.1%). Post-operatively, the pooled complete occlusion rate was 0.645, 95%CI [0.477-0.812]. The overall incidence of ischemia was 0.091, 95%CI [0.049-0.132].

Conclusions:

Using the Pipeline Embolization Device is a feasible option in the treatment of aneurysms located in the posterior circulation. The complete occlusion rate is acceptable. Cautions should be taken to avoid post-operative ischemia.

Keywords: Aneurysm, Flow Diverter, Pipeline, Embolization

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS: PRIMARY CATEGORY - INTERACRANIAL HEMORRHAGE

Poster 43 & E-Poster 43

Atrial Fibrillation, Dementia, and Their Relationship in the Intracerebral Hemorrhage Population Sujani Bandela, MD¹, Helmi Lutsep, MD¹

¹Oregon Health and Science University, Portland, Oregon, USA

Introduction:

Atrial fibrillation (AF) and dementia have a relationship that is becoming known. We hypothesize that AF is associated with dementia and treatment of AF with anticoagulation (AC) results in a lesser association with dementia in a population with intracerebral hemorrhages (ICH).

Methods:

We used a single center stroke database to extract information from the years 2015-2018. A retrospective study was performed of all ICH patients with MRI imaging ordered as part of their workup. The inclusionary criteria included patients with MRI T2* sequence, ICH, and above 18 years of age. Exclusionary criteria were anyone who did not have an MRI T2* sequence and AF that was diagnosed less than 5 years ago. We were able to extract information such as AF, AC use and a documented dementia diagnosis. We used a Chi square test and Logistic Regression to look at these relationships. We separated the variables into binomial variables for AF and dementia diagnoses and also multivariate variables of AC or other antiplatelet therapy use.

Results:

There were 990 patients total and 280 patients met the inclusionary criteria. Patients with dementia had an association with AF when compared to patients without AF ($X2 \ge 8.34$, p=.004). Patients on no antithrombotics with AF had an association with dementia of X2=2.7, p=0.01. Aspirin or clopidogrel use in AF patients had an association with dementia of X2=3.1, p=0.03. This differed from AF patients on warfarin or direct oral anticoagulants who did not have an association with dementia X2=1.39, p=0.11.

Conclusions:

Atrial fibrillation is less frequently associated with dementia in patients presenting with ICH who were treated with anticoagulation as opposed to no antithrombotic use or antiplatelet therapy.

Keywords: Antiplatelet

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS: PRIMARY CATEGORY - INTERACRANIAL STENOSIS

Poster 44 & E-Poster 44 Cannabis Use and Intracranial Stenosis: Case report and literature review <u>Marion J Oliver, MD</u>¹, Muhib A Khan, MD¹

¹Spectrum Health, Grand Rapids, Michigan, USA

Introduction:

The prevalence of ischemic stroke in adults ages 25 to 44 has increased by 43.8% between 2000-2010. One proposed mechanism is an increase in the incidence of ICS. Various etiologies of ICS exist, but a 5 year observational study found that use of vasoactive substances - particularly THC- was the most significant risk factor for developing multivessel ICS with subsequent ischemic stroke in young adults. Several other case reports exist in the literature of young patients without significant vascular risk factors apart from cannabis use who presented with ischemic stroke and were found to have ICS. As the use of THC in the United States is increasing, it is important to investigate.

Methods:

39 year old male with a three-day history of intermittent dysarthria, left hand numbness, weakness and incoordination. Patient had no known history other than smoking THC daily for 30 years. FH was significant for stroke in his parents. Exam showed dysarthria, weakness and dysmetria in left upper extremity. NIHSS was 3. CTA showed severe right MCA stenosis along with moderate to severe left ACA/right PCA stenosis. MRI brain showed ischemic stroke in right frontal and occipital lobes.

Results:

His symptoms improved on day 2 of admission, was discharge with smoking cessation counseling and was placed on DAPT with instructions for follow up. He continued to have waxing and waning of symptoms that lasted <30 minutes which was addressed as outpatient. He remained on DAPT for 3 months and then proceed to monotherapy.

Conclusions:

Ischemic stroke has previously been reported to be greater in cannabis users than in those who do not use cannabis due to varioius possible mechanisms, one being ICS. This case supports the notion that chronic THC use is a risk factor for ICS, even in the absence of other risk factors.

Keywords: Acute Stroke, Cerebrovascular Disease, Stroke, Vascular Imaging, Drugs Side Effects

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS: PRIMARY CATEGORY - ISCHEMIC STROKE

Poster 20 & E-Poster 20 Large Vessel Occlusion Detection with Novel EEG-based Device <u>Matthew R Kesinger, Mr.¹</u>, Liam Berti, Mr.¹, Madeleine R Wilcox, Dr.¹, Andrew Maza, Mr.¹

¹Forest Devices, Pittsburgh, Pennsylvania, USA

Introduction:

Several prehospital stroke severity scales have been developed to provide quick and accurate triage to facilitate timely treatment. This study evaluated a portable, experimental electroencephalogram (EEG) device (AlphaStroke, Forest Devices, Pittsburgh, PA) using artificial intelligence (AI) as a potential tool for detection of large vessel occlusion (LVO) among patients with neurological deficits. Both device performance and feasibility in the emergent setting were assessed.

Methods:

This observational study enrolled a convenience sample of emergency department (ED) patients evaluated for suspected stroke within 24 hours of symptom onset. LVO and stroke status were determined by local neuroradiologists blinded to AlphaStroke's output. LVO was defined as an acute occlusion of the any of the following arteries: ICA/MCA-(M1 or M2)/vertebral/ basilar. Controls were neurologically normal subjects (NIHSS=0).

Results:

From April 2018 to September 2019, eight urban US stroke centers enrolled 137 subjects that were being evaluated for stroke. The study also enrolled 110 controls. Of the subjects with neurologic deficits, mean (\pm SD) age was 66 (\pm 16), 37% were female, and the median (IQR) NIH stroke score was 6 (3 – 11). Median (IQR) last known well time was 329 minutes (193 – 697). In subjects with acute neurologic deficits, 98 had stroke (72%) and 26 had LVOs (19%). The device performed with 86% sensitivity and 80% specificity. The positive predictive value was 34% and negative predictive value was 98%. There were no severe adverse events related to use of the device.

Conclusions:

The AlphaStroke device performed well in identifying LVO in patients presenting with suspected stroke. The performance of the AlphaStroke device in the acute setting indicates that it may be able to support prehospital decision making when triaging suspected stroke subjects. Additional studies with larger sample sizes are needed to validate this study's findings.

Keywords: Ischemic Stroke

Financial Disclosures: Employed by Forest Devices

Poster 45 & E-Poster 45

Outcomes in Direct versus Transfer in Korean patients with acute ischemic stroke and mechanical thrombectomy

<u>Je Hong Min, Resident</u>¹, Yang-Ha Hwang, Physician², Seong-Joon Lee, Physician¹, Ji Man Hong, Physician¹, Jin Wook Choi, Physician¹, Dong-Hun Kang, Physician², Yong-Won Kim, Physician², Yong-Sun Kim, Physician², Jeong-Ho Hong, Physician³, Joonsang Yoo, Physician³, Chang-Hyun Kim, Physician³, Sung-Il Sohn, Physician³, Jin Soo Lee, Physician¹

¹Ajou University Medical Center, Suwon, Korea (Republic of); ²Kyungpook National University, Daegu, Korea (Republic of); ³Keimyung University Dongsan Medical Center, Daegu, Korea (Republic of)

Introduction:

Mechanical thrombectomy in acute ischemic stroke has shown significant benefits and also is timedependent. However, the impact of transfer status on functional outcomes after hyperacute stroke management is contradictory and not well-studied in Korea. We aimed to analyze outcomes between interhospital transfer [drip & ship (DS)] and direct transfer [mothership (MS)] models in Korea.

Methods:

We retrospectively analyzed patients with acute ischemic stroke who performed consecutive intravenous thrombolysis and endovascular treatment in three Korean comprehensive stroke centers between January 2011 and February 2016. Patients with anterior circulation stroke who could perform endovascular treatment within 6 hours after symptoms onset were eligible for this study. The primary end point was functional independence (90-day modified Rankin Scale [mRS] score, 0~2). Multivariate logistic regression was used to identify the association between clinically relevant time metrics, transfer status and functional outcome (mRS 0~2).

Results:

A total of 312 patients were enrolled. Among them, 42 (13%) patients were DS group, and 270 (87%) patients were MS group. Median time from onset-to-arrival time (187.9 versus 88.9 minutes, P < 0.001) was longer but median time from arrival-to-groin puncture (81.4 versus 103.2 minutes, P < 0.001) was shorter in the DS group than the MS group. Rates of functional independence did not differ between the groups (56.1% versus 47.6%, P = 0.302). Although reductions in onset-to-groin puncture time was associated with functional independence (Odds ratio [OR], 0.994; 95% confidence interval [CI], 0.989 to 0.999; P = 0.025), there was no interaction between DS and onset-to-groin puncture time (P = 0.733).

Conclusions:

Although onset-to-groin puncture time was longer in the DS group, intravenous thrombolysis and mechanical thrombectomy achieved similar rates of functional independence compared to the MS group. These results stress the importance of primary stroke centers, and encourages efforts to improve prehospital triage protocols of primary stroke centers in Korea.

Keywords: Acute Ischemic Stroke Intervention, Ischemic Stroke, Acute Stroke

Financial Disclosures: The authors had no disclosures.

Poster 46 & E-Poster 46

Endovascular therapy of distal MCA- M3 occlusions: A Single-Center Experience

<u>Kalyan Sajja, MD¹</u>, Nabeel Herial, MD², Larami Mackenzie, MD¹, Hana Choe, MD¹, Osman Kozak, MD¹, Qaisar Shah, MD¹

¹Abington- Jefferson Health, Abington, Pennsylvania, USA; ²Jefferson University Hospital, Philadelphia, Pennsylvania, USA

Introduction:

Mechanical thrombectomy is the standard of care for proximal large vessel occlusions. It is unclear if the results from the recent large studies demonstrating benefit of Mechanical thrombectomy in Acute ischemic stroke due to large vessel occlusions can be extrapolated to patients with distal vessel occlusions. Limited evidence exists for thrombectomy in M3 distal vessel occlusions. We present a case series of consecutive thrombectomies in M3 distal vessel occlusions and their outcomes at our center.

Methods:

All the MCA occlusions from our center's intervention database were reviewed. Consecutive M3 occlusions between July 2016- July 2019 which were treated with thrombectomy were presented. Prior to July 2016, the M3 occlusions were treated with IA tPA and were not included in this case series. The M3 occlusions that were not treated with thrombectomy were also not included. Successful reperfusion was defined as Thrombolysis in Cerebral Infarction score of 2B - 3.

Results:

7 consecutive patients who were found to have either a single or multiple M3 occlusions were treated with thrombectomy between July 2016 - July 2018 . TICI 2B and TICI 3 was achieved in 5 of the patients. 2 patients had TICI 2A recanalization. 5 of the patients had mRS between 0-2 at the time of discharge. The median NIHSS at presentation was 15 and the median NIHSS at discharge was 4.5. Trevo stent retriever 3 mm x 20 mm was used in all of the patients. The number of passes ranged from 1-3. There were no instances of symptomatic Intracranial hemorrhage.

Conclusions:

In conclusion, endovascular reperfusion therapy appears to be safe and effective in patients with acute ischemic stroke and M3 occlusion.

Keywords: Acute Stroke, Acute Ischemic Stroke Intervention, Interventional Neuroradiology

Financial Disclosures: The authors had no disclosures.

Poster 47 & E-Poster 47

Effect of Cholesterol Reducers on Predicting Clinical Risk Factors for NIHSS scores in Ischemic Stroke Nicolas S Poupore, B.S.¹, Thomas I Nathaniel, Ph.D.¹

¹University of South Carolina School of Medicine Greenville, Greenville, South Carolina, USA

Introduction:

Currently, there is a lack of research studying the effects of cholesterol reducer (CR) medications on patients with an acute ischemic stroke (AIS). With research suggesting that a significant dichotomy around an NIHSS score of 7 is significant for differing stroke outcomes, our objective was to evaluate the effect of CRs on the relationship between clinical risk factors and NIHSS scores in AIS patients who received rtPA.

Methods:

Data were collected from an ischemic stroke registry. Of 5,569 non-randomized patients retrospectively identified with an AIS, 1,327 (24.3%) patients received rtPA. In this population, 630 (47.5%) patients were taking a CR. Logistical models were built to generate odds ratios (OR) to determine which clinical factors influenced the likelihood of presenting with an NIHSS score ≥7.

Results:

In the non-CR group, older patients (OR = 1.027, 95% CI, 1.014-1.041, P < 0.001) and heart rate (OR=1.016, 95% CI, 1.005-1.027, P=0.005) were associated with an NIHSS score > 7. Family history of stroke (OR=0.511, 95% CI, 0.264-0.99, P=0.047), migraines (OR=0.250, 95% CI, 0.130-0.943, P=0.038) and obesity (OR = 0.685, 95% CI, 0.473-0.992, P = 0.045) were associated with an NIHSS score \leq 7. For the CR group, Increasing Age (OR = 1.032, 95% CI, 1.015-1.048, P < 0.001) and Atrial Fibrillation (OR = 1.859, 95% CI, 1.098-3.149, P = 0.021) were associated with an NIHSS score > 7.

Conclusions:

In patients with an AIS who received rtPA, taking a CR may negate the influence of heart rate, family history of stroke, migraine, and obesity on NIHSS score, but it may establish the effect of atrial fibrillation on higher NIHSS scores. CRs potentially were unable to prevent the influence of age on higher NIHSS scores. We believe this study will be clinically relevant in management of AIS patients with different CR statuses.

Keywords: Ischemic Stroke, NIHSS, TPA

Financial Disclosures: The authors had no disclosures.

Poster 48 & E-Poster 48

Predicting Functional Ambulation in Patients with a TIA within 24 Hours Preceding an Ischemic Stroke <u>Nicolas S Poupore, B.S.¹</u>, Tristan Mackey, B.S.¹, Thomas I Nathaniel, Ph.D.¹

¹University of South Carolina School of Medicine Greenville, Greenville, South Carolina, USA

Introduction:

A transient ischemic attack (TIA) is defined clinical as an ischemic and functional neurological deficit without a structural lesion. A TIA typically presents with gait disturbances and motor weakness that resolves without treatment. Due to TIA being a high-risk clinical factor for a stroke, we believe in the importance of characterizing how rtPA may affect functional outcome of a patient with a precedent TIA and subsequent stroke within 24 hours. Our objective was to analyze the clinical characteristics that influenced improvement in functional outcomes in patients with an acute ischemic stroke (AIS) that had a TIA within 24-hour prior.

Methods:

We analyzed data from an ischemic stroke registry. In the population of 6,379 AIS patients, 1,387 (21.7%) patients had a previous TIA within 24 hours of their stroke. Of this subpopulation, 164 (11.8%) were treated with rtPA. Logistical models were used to generate odds ratios (OR) to determine which clinical factors influenced the likelihood of improvement in ambulatory status in this group.

Results:

In the group with a TIA less than 24 hours prior, a history of stroke (OR = 3.229, 95% Cl, 1.494-6.98, p = 0.003) was associated with improvement in functional outcome, while being female (OR = 0.462, 95% Cl, 0.223-0.956, P = 0.037) was associated with a poor functional outcome.

Conclusions:

In the group with a TIA within 24 hours prior to their AIS, it was significant that having a history of stroke may lead to better functional outcomes, while being female may be influential with worse functional outcomes. We believe these results will be clinically relevant in the decision of whether to administer rtPA in patients with a TIA within 24 hours prior when considering their potential functional outcome.

Keywords: Ischemic Stroke, TIA, TPA

Financial Disclosures: The authors had no disclosures.

Poster 49 & E-Poster 49

Retained Microwire <u>Feroze Afzal, MD¹</u>, DAN-VICTOR GIURGIUTIU, M.D.¹

¹Augusta University, Augusta, Georgia, USA

Introduction:

There is extensive literature on the natural history of retained coronary microwires, but limited information in neuroendovascular ischemic cases.

Methods:

A 56 year old male presented with transient altered vision and aphasia Initial NIHSS was 0. CT angiogram (CTA) showed left internal carotid (ICA) occlusion cervical to ophthalmic segment. Perfusion imaging (using RAPID) showed cerebral blood flow 6.0 s volume 106 ml. MRI showed multifocal left middle cerebral artery (MCA) acute infarcts, with extension on a follow up MRI. Catheter angiogram showed left petrous occlusion with limited collateral flow. Patient underwent petrous thrombectomy, cavernous angioplasty, and Wingspan stenting. We attempted to cross the stenosis with a Gateway balloon and Synchro2 microwire. The wire tip was trapped, and separated when the wire was withdrawn after extensive rotation, with a retained 5 mm tip. The tip was secured with a Wingspan stent. Aphasia improved post reperfusion ,but worsened 4 days later. CTA showed ICA reocclusion and intraluminal microwire extending from the stent to the aortic arch. The inner core of the microwire had unwound, but was invisible on fluoroscopy.. Thrombus was aspirated, and ICA reconstructed with coronary stents in the petrous, and self-expanding stents in the cervical segments.

Results:

CT chest, abdomen and pelvis on 7 months later showed the wire extending from left common carotid to the superior mesenteric artery, and the patient was asymptomatic.

Conclusions:

A retained wire can predispose to reocclusion, and should be secured. Once secured the course can be benign.

Keywords: Acute Ischemic Stroke Intervention

Financial Disclosures: The authors had no disclosures.

Poster 50 & E-Poster 50

Functional Outcome Following Thrombolysis Therapy in Ischemic Stroke Patients with Pre-Stroke Depression

Leah Wormack, M.S.¹, Brice Blum, B.S.¹, Benjamin Bailes, B.S.¹, Thomas Nathaniel, Ph.D.¹

¹University of South Carolina School of Medicine Greenville, Greenville, South Carolina, USA

Introduction:

Post-stroke depression is a common occurrence and linked with poor outcome and alterations in ambulatory status. It is known that in ischemic stroke patients, pre-stroke clinical risk factors may predict ambulatory recovery following thrombolysis therapy. However, the effect of specific clinical risk factors that may be predictive of ambulatory outcome in ischemic stroke patients with pre-stroke depression treated with thrombolysis therapy is not fully understood.

Methods:

Retrospective data was collected from a stroke registry between January 1, 2010 to June 30, 2016. We developed a logistic regression model to predict the recovery of ambulatory function 14 days after stroke recovery. Patient demographics and clinical risk factors served as predictive variables, while improvement or no improvement in ambulatory outcome was considered as the primary outcome. Multivariate analyses were performed to identify predictors of functional ambulatory outcomes.

Results:

A total of 1,446 patients were eligible for rt-PA and 595 of these patients received rt-PA. Of the 595 patients, 310 patients presented with pre-stroke depression, 217 had no improvement in functional outcome, while 93 patients presented with an improvement in functional outcome. Carotid artery stenosis (OR= 11.577, 95% CI, 1.281 – 104.636, P=0.029) and peripheral vascular disease (OR= 18.040, 95% CI, 2.956-110.086, P=0.002) were more likely to be associated with an improvement in ambulation. Antihypertensive medications (OR= 7.810, 95% CI, 1.401 –43.529, P=0.019), previous TIA (OR= 0.444, 95% CI, 0.517 –0.971, P=0.012), and congestive heart failure (OR= 0.217, 95% CI, 0.318 –0.402, P=0.030) were associated with a no improvement in ambulation.

Conclusions:

Pre-stroke depression is associated with abnormal modification of risk factors in ischemic stroke and may affect functional ambulatory outcome following rtPA. After adjustment for covariates, more clinical risk factors were associated with no improvement when compared with improvement in functional outcome following thrombolysis therapy in an acute ischemic stroke population with pre-stroke depression.

Keywords: Ischemic Stroke, Functional Recovery In Stroke, TPA, Thrombolytics, Acute Ischemic Stroke Intervention

Financial Disclosures: The authors had no disclosures.

Poster 51 & E-Poster 51

Delays in Door to Groin Puncture in Acute Stroke Mechanical Thrombectomy - UCLA Experience <u>Ashkan Mowla, Dr.</u>¹, Faisal Mukarram, Mr.¹, May Nour, Dr.¹, Geoffrey P Colby, Dr.¹, Satoshi Tateshima, Dr.¹, Reza Jahan, Dr.¹, Gary R Duckwiler, Dr.¹, Viktor Szeder, Dr.¹

¹UCLA Medical Center, Los Angeles, California, USA

Introduction:

Mechanical thrombectomy (MT) for acute ischemic stroke(AIS) due to large vessel occlusions (LVO) has demonstrated a dramatic clinical benefit in numerous randomized control trials. Studies have shown that delays in door to groin puncture time (DGPT) for patients with AIS caused by LVO are associated with worse clinical outcomes. Recent recommendations from the Society of Vascular and Interventional Neurology (SVIN) offer procedural metrics which include DGPT less than 90 minutes.

Methods:

We retrospectively reviewed the medical charts of all AIS patients who had MT in the CSCs affiliated with UCLA Interventional Neuroradiology Division (UCLA Medical center and Long Beach Memorial Hospital) between August 2018 and March 2019 to identify those with a DGPT time of > 60 min. DGPT time of > 60 min is considered delayed. We categorized the factors causing the delay into 10 different groups . For each group, we suggested measures to reduce the treatment delays.

Results:

A total of 54 patients were found to have DGPT time of > 60 min in both centers (Range : 61 min to 273 minutes). In 3 (5.5%) of these patients more than one delaying factor was identified. Delays related to obtaining non-invasive stroke imaging accounted for the largest portion of the delays (31.4%). Traffic-related delays (20.3%) only occurred in patients being treated at the Long beach Memorial hospitals.

Conclusions:

Although in some cases delays might be unpreventable, we suggested measures and strategies in particular areas in which delays might be prevented. Delay in DGPT might be multifactorial and significant reduction of delays cannot usually be achieved by a single intervention, rather result from continuous analysis and improvement of the whole system, a fact acknowledged during the pivotal MT randomized clinical trials.

Keywords: Acute Ischemic Stroke Intervention

Financial Disclosures: speakers bureau/consultant for FDA approved indications of Xarelto (Janssen Pharma) speakers bureau/consultant for FDA approved indications of Andexxa (Portola Pharma)

Poster 55 & E-Poster 55

National Trends in Utilization and Outcomes of Mechanical Thrombectomy in Acute Ischemic Stroke Liqi Shu, Dr.¹, Yidan Jin, Ms.², Kaiwen Zheng, Ms.³, Diogo C Haussen, Dr.⁴

¹Department of Neurology, the Warren Alpert Medical School of Brown University, Providence, Rhode Island, USA; ²Economics department, Georgetown University, Washington, District of Columbia, USA; ³Guangdong Country Garden School, Foshan, China; ⁴Department of Neurology, Emory University, Grady Memorial Hospital, Atlanta, Georgia, USA

Introduction:

In early 2015, several pivotal trials showed compelling evidence that mechanical thrombectomy improves outcomes in acute ischemic stroke (AIS). We performed analysis to evaluate trends in utilization and outcomes of endovascular treatment among stroke patients over a four-year period.

Methods:

From the Healthcare Cost and Utilization Project Nationwide Inpatient Sample database, we obtained inhospital patient data with a primary diagnosis of AIS in the US from 2012 to 2015. AIS, endovascular treatment and other diagnosis were identified based on ICD codes. The population was dichotomized by the time period: 2012-2014 (pre-trial) and 2015 (post trial-publication). We compared the rate of endovascular treatment for AIS, date of procedure since admission (admission = day 0), occurrence of intracranial hemorrhage (ICH) by t-test and clinical outcomes (discharge disposition) by logistic regression analysis. All analyses were performed in Stata/SE15.1 software.

Results:

Of the 351,967 patients admitted from 4,874 hospitals throughout the US with AIS, 5,003 (1.42%) underwent endovascular treatment. The endovascular treatment rate doubled from 2012 (1.09%) to 2015 (2.16%, p = 0.0001). In patients who received endovascular treatment between the two study intervals (3,402 in 2012-2014 versus 1,601 in 2015), date of procedure has significantly decreased from 0.46 to 0.15 (p = 0.0001) days, and ICH occurrence remained unchanged (22.5% vs 23.7%, p = 0.35). In logistic regression analysis, after adjusting for age, gender, hypertension, heart failure, renal failure, ICH, diabetes, coagulopathy, chronic lung disease, acquired pneumonia, deep vein thrombosis, urinary tract infection, sepsis and pulmonary embolism, there was significant increase in home discharge rate (OR 1.33, 95% CI 1.13 – 1.57, p = 0.001), but no significant difference of in-hospital death rate (OR, 0.88, 95% CI 0.74 – 1.04, p = 0.134).

Conclusions:

Over the four years, endovascular treatment utilization has been significantly increased in AIS patients with improvement in patient morbidity but not mortality.

Keywords: Acute Stroke, Acute Ischemic Stroke Intervention, Ischemic Stroke, Revascularization, Mechanical Thrombectomy

Financial Disclosures: The authors had no disclosures.

Poster 57 & E-Poster 57

A Novel, Comprehensive Meta-analytic Software for Stroke Therapies

<u>Kevin Kallmes, MA</u>¹, Keith Kallmes, BS¹, Karl Holub, BS¹, Stephen Mead, BS¹, Jillienne Touchette, PhD², Mohamed Abdelmegeed, MD, PhD², John Pederson, BS², Natalie Reierson, BS¹, Nick Mikoff, BS¹, Ashley Mooneyham, PhD²

¹Nested Knowledge, St. Paul, Minnesota, USA; ²Superior Medical Experts, St. Paul, Minnesota, USA

Introduction:

Thrombectomy devices have revolutionized stroke care, but the comparative clinical efficacy of different devices remains a major research question. Even with the publication of HERMES, the lack of comprehensive, updatable, clearly presented meta-analyses across thrombectomy devices in the medical literature hampers transparency and community-wide discussion of key clinical data. Therefore, we have developed an interactive, online meta-analysis for stroke presenting comprehensive outcomes of thrombectomy studies.

Methods:

We followed PRISMA guidelines in designing an updatable PubMed search that covers all currently marketed stroke devices published since 2012. We included all comparative studies between devices or comparisons against medical therapy, and used Network Meta-analytical methods to compare device angiographic and clinical outcomes. We designed an interactive interface, including filters by year, hierarchy of evidence, and device, and visuals showing odds ratios between devices, the network of studies included, and cross-study correlations between patient characteristics and outcomes, as well as a feedback tool to enable clinician commentary on our constantly updated stroke meta-analysis.

Results:

We included 54 studies with 16,006 patients ranging from retrospective studies to randomized controlled trials. All thrombectomy devices except MERCI significantly outperformed IV-tPA with respect to TICI 2b/3, and both aspiration catheters and stent-trievers significantly outperformed IV-tPA with respect to mRS 0-2. Thrombectomy significantly outperformed IV-tPA with respect to mortality, and no device had any significant increase in either sICH or serious adverse events. Trevo had the highest odds of both TICI 2b/3 and mRS 0-2, while Penumbra had the lowest rate of mortality. We also validated our nested visualizations as a user-friendly method of communicating complex clinical data—over 10,000 comparisons—in a simplified, streamlined platform.

Conclusions:

This meta-analysis presented complex clinical data in an interface that enabled informed physician decision-making in an unprecedented method compared with journal publishing and serves as proof-of-concept for online, updatable, visual meta-analytical platforms.

Keywords: Mechanical Thrombectomy, New Innovation, Acute Stroke, Clinical Investigations, Decision Analysis

Financial Disclosures: Kevin Kallmes works for and owns equity in Nested Knowledge, Superior Medical Experts, and Marblehead Medical.

Poster 61 & E-Poster 61

Is trans - radial access safer than trans-Femoral access for acute stroke interventions?

<u>Amrinder Singh, M.D.</u>¹, Ashish Kulhari, M.D.¹, Gurneel Kaur Dhanesar, M.D.¹, Daniel Ro, M.D.¹, Farah Fourcand, M.D.¹, Mazhar Qureshi, Undergraduate¹, Spozhmy Panezai, M.D.¹, Haralabos Zacharatos, M.D.¹, Siddhart Mehta, M.D.¹, Jawad F Kirmani, M.D.¹

¹Hackensack Meridian JFK medical center, Edison, New Jersey, USA

Introduction:

Recently there has been emphasis on Trans-radial access (TRA) for acute neuro-intervention procedures. Cardiology trials including MATRIX, RIVAL, STEMI-RADIAL showed significantly lower incidence of access site bleeding, vascular complications and procedure related mortality along with better patient satisfaction and reduction in healthcare cost with TRA compared to Trans-femoral access (TFA). These studies also showed prolonged Door to reperfusion time along with higher rate of access site cross-over and radiation exposure with TRA. The aim of our study is to evaluate the safety of TFA in acute stroke interventions and compare it to TRA from the cardiac literature.

Methods:

Retrospective analysis of patients who underwent acute endovascular treatment for ischemic stroke at our comprehensive stroke center from 2014-2019 was done. Angiosuite Door to groin access times were obtained. Access site complications including major bleeding requiring treatment or leading to mortality or disability and vascular injuries requiring treatment were analyzed and compared to TRA from cardiac literature.

Results:

2,980 patients presented with acute ischemic stroke from 2014-2019. Of those 373 were LVOs who underwent endovascular treatment. Access site for all the patients was transfemoral. The mean age was 68. 55% patients were males. 42% patients received IV tPA. All patients had 8F access sheath. Mean Angiosuite door to groin access time was 31.7 minutes (SD- 10.9). Access site complications were 14 (3.7%) which is comparable to TRA in cardiology literature being 3-4%.

Conclusions:

TFA for acute stroke interventions can be achieved safely and efficiently. As proven in cardiology studies that TFA has faster recanalization times, we believe the same would hold true for stroke intervention. Additionally, TRA requires anticoagulation and vasodilators that may pose additional risk to stroke patients. As stroke interventions warrant extra support requiring 8F access, TRA with 8F sheath would increase the risk of vasospasm and vascular complications.

Keywords: Ischemic Stroke

Financial Disclosures: The authors had no disclosures.

Poster 62 & E-Poster 62

Is there increased incidence of subarachnoid hemorrhage with use of stentrievers in distal circulation? <u>Ashish Kulhari, M.D.</u>¹, Daniel Ro, M.D.¹, Amrinder Singh, M.D.¹, Farah Fourcand, M.D.¹, Gurneel Kaur Dhanesar, M.D.¹, Zinal Vyas, M.D.¹, Haralabos Zacharatos, M.D.¹, Siddhart Mehta, M.D.¹, Jawad F Kirmani, M.D.¹

¹Hackensack Meridian JFK medical center, Edison, New Jersey, USA

Introduction:

Multiple recent positive endovascular trials have proven mechanical thrombectomy as standard of care for large vessel occlusion (LVO) of the Anterior Circulation (AC). Post-thrombectomy subarachnoid hemorrhage (PT-SAH) is a known complication of this procedure. The aim of this study was to compare the incidence of SAH in proximal (ICA terminus and MCA M1) versus distal (MCA M2 and beyond) LVOs with use of stentrievers.

Methods:

Retrospective analysis of patients who underwent anterior circulation acute ischemic stroke interventions (AISI) at a community based, university affiliated comprehensive stroke center during a 5 year period (2014-2019) was done. AISI using stentrievers were separated in 2 groups based on location of LVO (Proximal and Distal). Post procedure CT heads were reviewed for SAH in location of stent deployment.

Results:

2980 patients presented with acute ischemic stroke during the pre-specified time period. Of those, 2,682 were anterior circulation strokes. Of those, 373 received AISI. Stentrievers were used in 193 patients (85% Solitaire (n=163); 15% Trevo (n=30)). Among Solitaire group, most commonly used stent was 4X40 (n=86; 53%) followed by 6x30 (n=30; 18%), 4X20 (n=23; 14.2%), 6x40 (n=13; 8%), 6x20(n=7; 4.3%) and 4x30 (n=4; 2.5%). Among Trevo group, most common stent was 4x30 (n=17; 57%) followed by 6x25 (n=7; 23%), 3x20 (n=4;13%) and 4x20 (n=2; 7%). Proximal occlusions (ICA terminus and MCA M1) were placed into Group A (n=150). Distal occlusions (MCA M2 and beyond) were placed into Group B (n=43). Group A had 6% SAH (n=9); Group B had 16% SAH (n=7) (p value <0.05).

Conclusions:

This study reveals an increased incidence of PT-SAH for distal LVOs. Main limitation of the study is the small sample size. Next generation stentrievers with smaller stent size and different design may decrease incidence of PT-SAH. Larger prospective RCTs are warranted to validate these results.

Keywords: Acute Ischemic Stroke Intervention

Financial Disclosures: The authors had no disclosures.

Poster 63 & E-Poster 63

Challenging the conventional wisdom: Do posterior circulation Large Vessel Occlusions really require Stentrievers or Aspiration?

<u>Siddhart Mehta, M.D.</u>¹, Ashish Kulhari, M.D.¹, Amrinder Singh, M.D.¹, Farah Fourcand, M.D.¹, Daniel Ro, M.D.¹, (Peter) Yong-Bum Song, PharmD¹, Spozhmy Panezai, M.D.¹, Haralabos Zacharatos, M.D.¹, Jawad F Kirmani, M.D.¹

¹Hackensack Meridian JFK medical center, Edison, New Jersey, USA

Introduction:

Multiple recent positive endovascular trials have proven mechanical thrombectomy (MT) as standard of care for LVO of the Anterior Circulation (AC). MT in these studies focused on stentrievers and aspiration. None of these endovascular studies included patients with posterior circulation (PC) strokes. Best treatment options for PC LVO are a focus of intense investigation. Our study explores the safety and early efficacy of acute ischemic stroke interventions (AISI) other than stentrievers/aspiration in acute PC LVOs.

Methods:

Retrospective analysis of patients who underwent AISI for PC LVOs at our comprehensive stroke center from 2012-2019 was done. Complications were categorized in major versus minor. Initial NIHSS, discharge NIHSS and discharge mRS were abstracted. A severity matched comparison of discharge mRS to composite 90 day mRS of recent multi-centered prospective randomized control trials (MPRCT) for endovascular treatment of AC LVOs was made.

Results:

4340 patients presented with acute ischemic stroke during 2012-2019. Of those 477 were PC strokes; 32 underwent acute endovascular interventions (Intracranial stenting=22, standalone IA tPA and/or antiplatelet infusion=9, Stentriever=1) These were compared with 1,386 patients with AC LVOs included in the recent MPRCTs. The mean age was 64 (SD 15.23). Mean initial NIHSS was 17 (SD 9.06). Mean change in NIHSS was 9 (SD 7.87). Mean discharge NIHSS was 8 (SD 8.53). Mean discharge mRS was 3.4 (SD 1.66). There were no major complication and one minor complication (asymptomatic cerebellar hemorrhage). Comparative group analysis revealed no statistically significant difference when outcomes were compared to MPRCTs.

Conclusions:

The safety and early efficacy of non-conventional methods (intracranial stenting and standalone IA infusions) for PC LVO compares well with conventional methods (stentriever and aspiration) for AC LVO shown in recent MPRCTs. A prospective randomized trial should be attempted to elucidate the efficacy of these non-conventional methods vs stentriever/aspiration for PC LVO.

Keywords: Stentretriever, Acute Ischemic Stroke Intervention

Financial Disclosures: The authors had no disclosures.

Poster 64 & E-Poster 64

Does Faster Femoral access for acute stroke interventions compromise patient safety?

<u>Spozhmy Panezai, M.D.</u>¹, Ashish Kulhari, M.D.¹, Amrinder Singh, M.D.¹, Mazhar Qureshi, Undergraduate¹, Hemal Patel, M.D.¹, Sara Strauss, M.D.¹, Siddhart Mehta, M.D.¹, Haralabos Zacharatos, M.D.¹, Jawad F Kirmani, M.D.¹

¹Hackensack Meridian JFK medical center, Edison, New Jersey, USA

Introduction:

The outcomes of patients with large vessel occlusions (LVOs) significantly depends on the time from stroke onset to recanalization of the occluded vessel. Recanalization times are predominantly affected by Emergency department (ED) arrival to arterial puncture. In January 2017, to improve our recanalization times, we implemented a quality measure to achieve angiosuite arrival to arterial access within 25 minutes in >75% of cases. The aim of this study is to evaluate the safety of faster arterial access in acute stroke interventions.

Methods:

Retrospective analysis of patients who underwent acute endovascular treatment for ischemic stroke at a university affiliated, community based, comprehensive stroke center from 2014-2019 was done. Mean Angiosuite arrival to femoral access times before and after 2017 were obtained and compared. Access site complications including major bleeding requiring treatment or leading to mortality or disability and vascular injuries requiring treatment before and after 2017 were compared.

Results:

2,980 patients presented with acute ischemic stroke during the pre-specified time period. Of those 373 were large vessel occlusions who underwent endovascular treatment. Of those, 145 patients were from 2014 to 2016 and 228 patients were from 2017 -2019. Access site for all the patients was transfemoral. The mean age was 68. 55% patients were males. 42% patients received IV tPA . All patients had 8F access. Mean Angiosuite arrival to femoral access times were 41.3 minutes (SD – 6.9; 95 CI – 23.2 – 49.1) for 2014-16 versus 22.2 minutes (SD – 2.6; 95 CI – 19.2 -25.2) for 2017-19. Access site complications from 2014-2016 were 6 (4.1 %) and from 2017-2019 were 8 (3.5%).

Conclusions:

Our study shows that faster Angiosuite to femoral access is safely achievable. Larger multicenter prospective studies are needed to validate our results.

Keywords: Acute Ischemic Stroke Intervention

Financial Disclosures: The authors had no disclosures.

Poster 66 & E-Poster 66

"Bare Metal Versus First Generation Versus Second Generation Stents In Treatment Of Vertebral Artery Stenosis"

<u>Chike Ilorah, MD¹</u>, Chizoba Ezepue, MD¹, Aakash Bodhit, MD¹, Santiago Ortega-Gutierrez, MD², Paula Buchanan, PhD³, Randall Edgell, MD¹

¹Saint Louis University, Department of Neurology, Saint Louis, Missouri, USA; ²Universityof Iowa, Department of Neurology, Iowa City, Iowa, USA; ³Saint Louis University Center for Health Outcomes Research, Saint Louis, Missouri, USA

Introduction:

Twenty percent of strokes occur in the posterior circulation and vertebral artery (VA) origin stenosis constitute about twenty percent of these. VA stenting is a good treatment option for patients with VA origin stenosis. In-stent restenosis is a major limitation of this procedure. We compared in-stent restenosis in patients with symptomatic VA origin stenosis that were treated with bare metal (BM) vs first generation drug eluting stents (DES) vs second generation DES.

Methods:

A retrospective review of multicenter data base from 2000-2018 with a total number of 113 patients with significant VA origin stenosis were reviewed. We compared the difference between groups (BM, 1st generation, and 2nd generation stents) via ANOVA and multiple linear regression predicting restenosis from group, pre-stenosis values and time to follow-up. In addition, restenosis was categorized as 0 to = 50 and differences between groups were examined using Chi-square analysis.

Results:

There were 43 BM, 32 1st generation, and 38 2nd generation subjects. BM pre-stent stenosis mean (Standard Deviation) was 80.9 (10.3), 1st generation was 81.1 (11.2), and 2nd generation was 76.7 (14.5), p = 0.21. The mean stenosis at follow up for BM was 19.8 (29.3), 1st generation was 26.0 (30.6), and 2nd generation was 11.8 (21.8), p = 0.13. After adjusting for pre-stent stenosis and time to follow-up measurement, there was no difference in restenosis rates by group, p = 0.21. There was no difference between groups when categorizing the stenosis at follow up imaging into 0 to < 50 and >= 50, p = 0.42.

Conclusions:

The study showed no statistical significance in the rate of in-stent restenosis between bare metal vs first generation vs second generation stents in treatment of VA stenosis. Though not statistically significant, second generation stent showed the numerically lowest incidence of in-stent restenosis.

Keywords: Ischemic Stroke, Acute Ischemic Stroke Intervention, Endovascular Therapy, Extracranial Stenosis, Stenting

Financial Disclosures: The authors had no disclosures.

Poster 69 & E-Poster 69

Closing the Gap: Site Versus Central Core Assessment of Recanalization in the ARISE 2 study Marc Ribó, MD, PhD¹, Manuel Requena, MD¹, Tommy Andersson, MD, PhD², Hormozd Bozorgchami,

MD, PhD³, Heinrich Mattle, MD, PhD⁴, Jeffrey L Saver, MD⁵, Osama O Zaidat, MD⁶

¹Vall d'Hebron University Hospital, Barcelona, Spain; ²Karolinska University Hospital, Stockholm, Sweden; ³Oregon Stroke Center, Portland, Oregon, USA; ⁴Inselspital, Bern, Switzerland; ⁵Ronald Reagan UCLA Medical Center, Los Angeles, California, USA; ⁶Medical College of Wisconsin, Milwaukee, Wisconsin, USA

Introduction:

Modified Thrombolysis in Cerebrovascular Infarction (mTICI) score determines the success of endovascular treatment (EVT). mTICI 2b-3 is considered substantial reperfusion and is strongly associated with favorable outcome. It is believed that site operators (SO) tend to overestimate the degree of reperfusion compared with an independent core lab (ICL). We aim to evaluate the mTICI score concordance in the ARISEII (Analysis of Revascularization in Ischemic Stroke with EmboTrap) study

Methods:

SO and blinded ICL neuroradiologists determined the mTICI score after: 1) first pass, 2) last of up to 3 passes with study device, and 3) final pass with rescue device if needed . Substantial (mTICI 2b-3) and complete reperfusion (mTICI 3) were defined. Concordance between SO and ICL scores was evaluated

Results:

227 patients were included. Aggregate rates of complete reperfusion after first (SO, 28.6% Vs. ICL, 29.5%), last of up to 3 (SO 44.0% Vs. ICL 47.6%), and final pass (SO 53.7% Vs. ICL 52.0%) were similar. Aggregate rates of substantial reperfusion after first (SO 48.9% Vs. ICL 50.7%), up to 3 (SO 80.2% Vs. ICL 81.5%) and final pass (SO 92.1% Vs. ICL 92.1%) were also similar. However, when concordance was examined at individual patient level, only 61.7%, 58.8% and 56.6% agreement was found for first, last of up to 3, and final passes, respectively. Sites underestimated degree of reperfusion more than overestimated (23% vs 18%). 2c mTICl score had the least agreement, with concordance in 1/22 (4.5%), 6/48 (12.5%), and 6/54 (11.1%) cases for first, last of 3, and final passes.

Conclusions:

In ARISE II operators did not overestimate reperfusion compared with core lab neuroradiologists. High agreement of aggregate rates of reperfusion was found, but patient-level data showed less concordance for individual mTICI scores, and the score of 2c was the hardest to assign consistently.

Keywords: Acute Stroke, Mechanical Thrombectomy, Acute Ischemic Stroke Intervention

Financial Disclosures: Honararia for Lecturing from Cerenovus

Poster 70 & E-Poster 70

Short-term Blood Pressure Variability post Re-canalization is associated with Discharge Outcomes In Large Vessel Strokes

<u>Saurav Das, Senior Resident in Neurology</u>¹, Thomas Chandler, MPH², Conner Elliott, Medical Student¹, Stephen Furmanek, MPH, MS², Wei Liu, Associate Professor³, Kerri Remmel, Chair, Dept of Neurology¹, Ozan Akca, MD, FACC⁴

¹University of Louisville School of Medicine, Louisville, Kentucky, USA; ²University of Louisville, Department of Infectious Diseases, Louisville, Kentucky, USA; ³Dept of Neurology, University of Louisville, Louisville, Kentucky, USA; ⁴University of Louisville School of Medicine, Dept. of Stroke and Neuro-critical care, Louisville, Kentucky, USA

Introduction:

Blood pressure variability affects early neurological deterioration and clinical outcomes in acute ischemic stroke. Evidence to guide post re-canalization blood pressure (BP) changes is currently lacking. Our objective was to assess the role of blood pressure variability in predicting discharge outcomes in successfully re-canalized (TICI 2b-3) large vessel occlusion strokes (LVOs) strokes.

Methods:

The study includes retrospective analysis of 182 LVO stroke patients between the years 2015-19. Anterior circulation LVO stroke patients, who were successfully re-canalized (TICI 2b-3) within 6 hours of time since last seen normal were included in this retrospective analysis (n=87). BP measurements were collected hourly for the first 24 hours post re-canalization. Squared average real BP variability (ARV2) was calculated for systolic (SBP) and mean blood pressures (MAP). We compared four quartiles of ARV2 (Q1 the least and Q4 highest variability) using dichotomous outcome variables - modified Rankin Scale (mRS) \leq 2; and mRS \geq 5. The outcomes were adjusted for potential confounders including age, tPA, use of general anesthesia and hemorrhagic events.

Results:

When the baseline characteristics compared for all 4 blood pressure variability quartiles, the groups were similar. While 50% of patients in SBP ARV2 Q1 had favorable outcomes (i.e. mRS < 2), only 23% of Q4 patients experienced such outcomes. (aOR: 0.16 [0.02 - 0.90], p=0.050) Favorable outcomes (mRS < 2) were also significantly higher (aOR: 0.17 [0.03 - 0.80], p=0.034) in Q1 of the ARV2 MAP (45%) compared to the Q4 patients (18%).

Conclusions:

Less blood pressure variability –both for SBP and MAP- in the first 24 hours after TICI 2b-3 recanalization of LVOs is associated with a discharge mRS \leq 2. Impact of blood pressure variability (ARV2) on long-term functionality outcomes in successfully re-canalized LVO stroke patients needs further detailed exploration.

Keywords: Blood Pressure Management In Acute Stroke, Mechanical Thrombectomy, Recanalization, Stroke, Ischemic Stroke

Financial Disclosures: The authors had no disclosures.

Grant Support: Conner Elliott received a Summer Student scholar from the University of Louisville, School of Medicine to contribute to this research in the summer of 2018.

Poster 71 & E-Poster 71

In Patients With Early Neurological Improvement, Vessel Laterality Is Not Associated with Long Term Outcome

<u>Kristopher M Southard, MD¹</u>, Bhageeradh H Mulpur, MD¹, Lacy S Handshoe, DO¹, Nirmal Andrapalliyal, MD¹, M. Shazam Hussain, MD¹

¹Cleveland Clinic Foundation, Cleveland, Ohio, USA

Introduction:

Early neurologic improvement (ENI) has been increasingly shown to correlate with favorable long term outcomes, as defined by modified Rankin score (mRS) less than or equal to two at 90 days, after emergent large vessel occlusion (ELVO) treated with mechanical thrombectomy (MT). However, ENI is measured by the NIH stroke scale, which has been known to be biased towards the dominant hemisphere. In this analysis, we investigated whether patients with ENI following MT were more likely to have good long term outcome if their ELVO was in the dominant hemisphere of the anterior circulation.

Methods:

A review of all patients presenting to a comprehensive stroke center from January 2016 to July 2019 with ELVO undergoing MT was completed. Two patient groups were established: 1) those with dominant and 2) non-dominant ELVO who achieved ENI. ENI was defined as a 40% reduction of the National Institutes of Health Stroke Scale (NIHSS) at day 1 compared to admission NIHSS. We examined the association of hemispheric dominance with favorable outcome (90 day mRS 2) in patients with ENI.

Results:

ENI was observed in 127 out of 289 patients. Of 127 patients who achieved ENI, 62 were identified as dominant hemisphere and 65 were non-dominant hemisphere. 32 of 62 (52%) of dominant hemisphere and 38 of 65 (58%) of non-dominant hemisphere patients had good long term clinical outcome (p = .44).

Conclusions:

Although NIH stroke scale, and therefore assessments of ENI, are suspected to favor dominant hemisphere ELVO, there is no significant increased association with favorable long-term clinical outcomes between dominant and non-dominant hemisphere patients with ENI. Further investigation into the meaning and limitations of ENI in predicting long term clinical outcome is warranted.

Keywords: Acute Ischemic Stroke Intervention, Cerebrovascular Disease, MRS, Functional Recovery In Stroke

Financial Disclosures: The authors had no disclosures.

Poster 73 & E-Poster 73

Increasing Detection of Paroxysmal Atrial Fibrillation with Prolonged Monitoring Using AS5F Score. <u>Shyam C Majmundar, M.D.</u>¹, Elan Miller, MD¹, Jane Khalife, MD¹, Nabeel Herial, MD¹, Mayla Sahu, Medical Student², Jade Park, Medical Student², Diana Tzeng, MD¹, Rodney Bell, MD¹

¹Thomas Jefferson University, Department of Neurology, Philadelphia, Pennsylvania, USA; ²Sidney Kimmel Medical College, Philadelphia, USA

Introduction:

In the evaluation of cryptogenic ischemic strokes, the required duration of cardiac rhythm monitoring remains debated. Diagnostic yield in detecting paroxysmal atrial fibrillation (pAF) is reportedly higher with longer duration of monitoring. Multiple calculators such as AS5F score (Age, Stroke Severity NIHSS >5 to Find AF) have been developed to guide clinical evaluation. The AS5F clinical score identifies patients with higher predictive risk for pAF with prolonged (72-hr) ECG monitoring. We evaluate the diagnostic yield of long term monitoring with implantable loop recorder (ILR) in the high predictive risk group based on the AS5F score.

Methods:

A retrospective review of data on cryptogenic stroke patients was conducted and 120 patients with ILR and suspected cardioembolic etiology were identified. 54 patients met the AS5F study criteria and included in the analysis.

Results:

Of the 54 patients (M=25, F=29 and mean age of 72.7 yrs), 23 patients (42.6%) had an AS5F score \geq 67.5 indicating high predictive risk of pAF within 72 hours. ILR found pAF in 7 (30.4%) of those patients beyond 72 hrs.

Conclusions:

The period to monitor pAF has been a minimum of 24hours in the setting of acute stroke. By applying the AS5F score to the same population we increase the incidence of identifying pAF to 30.4% with prolonged monitoring (beyond 72 hours) through ILR.

Keywords: Acute Stroke, Medical Management, NIHSS, Stroke, TIA

Financial Disclosures: The authors had no disclosures.

Poster 74 & E-Poster 74

The Relationship Between Intra-Procedural Contrast Extravasation and Intracerebral Hemorrhage Following Mechanical Thrombectomy: A Case Series

<u>Hassan A Fadel, MD¹</u>, Hisham S Alhajala, MD¹, Alex B Chebl, MD, FSVIN¹, Horia Marin, MD¹, Maximilian K Kole, MD¹

¹Henry Ford Hospital, Detroit, Michigan, USA

Introduction:

Intracerebral hemorrhage (ICH) following revascularization for acute ischemic stroke with large vessel occlusion (LVO) is a potentially severe complication requiring timely identification and treatment. Early recognition of ICH can inform management and improve patient outcomes. We aimed to examine the factors associated with intra-procedural contrast extravasation and ICH.

Methods:

A prospective database of all patients treated with mechanical thrombectomy at our institution was queried to identify patients with intra-procedural contrast extravasation and subsequent ICH. Patient characteristics, presenting symptoms, radiological and vessel characteristics, use of intravenous tPA, procedural details, and clinical status were reviewed.

Results:

Between January 2017 and June 2019, 248 patient underwent mechanical thrombectomy for LVO. Five patients with ICH following intra-procedural contrast extravasation were identified. Four of the five patients were female with a mean age of 75 years (range 67-80). All patients presented with MCA occlusion (four M1, one M2) and all had received tPA prior to intervention. Onset-to-needle time for all patients was < 6 hours. The mean ASPECTS score on arrival was 9.8 (range, 9-10). All patients achieved adequate (TICI 2b and TICI 3) revascularization using a stent-retriever device, with all procedures requiring one pass. ICH mean volume was 34.3 cm3. At time of discharge, two (40%) patients had significant disability (mRS 4), one patient (20%) had minimal symptoms (mRS 1) and two (40%) patients had died.

Conclusions:

Intra-procedural contrast extravasation is associated with poor neurological outcomes. In our case series, pre-procedural thrombolytic therapy and MCA vessel involvement were related to intra-procedural contrast extravasation and ICH. Incidence of contrast extravasation was independent of ASPECTS score, number of passes, or onset-to-needle time. To minimize the life-threatening risk of ICH imposed on patients, and to guide post-procedural medical management, we propose that the relationship between intra-procedural contrast extravasation and ICH be evaluated further.

Keywords: Acute Ischemic Stroke Intervention, Mechanical Thrombectomy, Intracerebral Hemorrhage, Thrombolytics

Financial Disclosures: The authors had no disclosures.

Poster 75 & E-Poster 75

Association of Educational Level with Delay in Presentation and Utilization of Acute Ischemic Stroke Therapies

Mario P Zamora, MD¹, Erika T Marulanda-Londono, MD², Jose G Romano, MD², Dileep R Yavagal, MD²

¹University of Miami/Jackson Memorial Hospital, Miami, Florida, USA; ²University of Miami, Miami, Florida, USA

Introduction:

Despite well-documented efficacy of acute ischemic stroke (AIS) therapies and recent expansion of treatment window, AIS treatment utilization rates remain low. Population-based surveys suggest that lower educational level correlates with limited knowledge of AIS existing therapies and importance of early presentation. This study aimed to determine if there is an association with educational level, delay in presentation, and utilization of AIS therapies.

Methods:

We analyzed 343 AIS patients presenting to a large, tertiary care academic medical center from February-December 2018. Educational level was defined as: grade school (GS), high school (HS), college or higher (CH), and unknown with patients categorized by highest level attended, even if not completed. Race and gender, NIH Stroke Scale score, stroke location, location of large vessel occlusion (if present), LDL, hemoglobin A1c, history of stroke or myocardial infarction, and atrial fibrillation were obtained. Primary outcomes were mean onset-to-arrival time (OTA), in minutes, and utilization rates of AIS therapies (IV r-tPA, mechanical thrombectomy, or both).

Results:

Lower educational level was associated with longer OTA time; OTA for GS (781, \pm 197) was much higher than HS (204, \pm 43), and CH (49, \pm 27). AIS therapy utilization (both tPA and thrombectomy) increased with higher educational level; with 26% of those with GS treated vs. 42% of HS, and 47% of CH. Mechanical thrombectomy use in GS (4%), was much lower than both HS (30%) and CH (21%).

Conclusions:

Lower educational level was associated with increased OTA and lower utilization of AIS therapies. Lower rate of AIS therapy utilization in patients with lower educational level may be due to longer OTA times, but further analysis is needed to assess for presence of factors independent of OTA delays. These findings highlight the need for targeted stroke public health education.

Keywords: Acute Ischemic Stroke Intervention, Clinical Investigations, Epidemiology, Mechanical Thrombectomy, Treatment

Financial Disclosures: The authors had no disclosures.

Poster 76 & E-Poster 76

Disparities in Utilization of Endovascular Thrombectomy for Acute Ischemic Stroke: Nationwide trends from 2006-2016

Shahram Majidi, MD¹, Amol Mehta, MD², Laura Stein, MD¹, J D Mocco, MD¹, Johanna T Fifi, MD¹

¹Icahn School of Medicine at Mount Sinai, New York, New York, USA; ²Columbia University, New York, New York, USA

Introduction:

Previous studies have demonstrated significant racial and socioeconomic disparities in provision of endovascular thrombectomy (EVT). We aimed to determine the trends in utilization of EVT and investigate disparities in a nationally representative analysis.

Methods:

We identified all patients admitted with acute ischemic stroke (AIS); utilizing nationwide inpatient sample (NIS) from 2006-2016. Patients' gender, race, annual household income and insurance status was identified. We also identified the rate of treatment with EVT in each group and analyzed trends in utilization of EVT from 2006 to 2016.

Results:

A total of 8,349,646 patients with AIS were identified from 2006 to 2016 with 0.66% of them had EVT. The number of EVT increased from 250(0.03%) in 2006 to 2498(2%) in 2016. Fifty-four percent of the patients were women, 71% were whites and 24% were black/Hispanics. Seventy four percent of the patients were Medicare/Medicaid beneficiaries, and 19% had private insurance. The utilization of EVT among white patients was higher than black patients(0.69% vs 0.56%, p<0.001). The rate of EVT among women were lower than men(0.63%% vs 0.73%, p<0.001) and lower among Medicare/Medicaid patients compared to privately insured patients(0.72% vs 0.92%, p<0.001). While the proportion of EVT increased from 0.03% in 2006 to 2% in 2016 for entire population, this increase was higher for white patients (1.93%) compared to black(1.62%), Hispanic(1.86%) and privately insured patients(2.39%). In multivariate analysis, female gender(OR 0.91, 95% CI[0.87 – 0.95], p < 0.001), black race(OR 0.80 95% CI[0.73 – 0.89], were independent predictors of lower EVT utilization, whereas higher household income(OR 1.14, 95% CI[0.14 – 1.27], p<0.01), and private insurance status(OR 1.26, 95% CI[1.19-1.33]) were independent predictors of higher EVT utilization.

Conclusions:

Despite approximately seven folds increase in utilization of EVT among patients with AIS, significant disparities exist in provision of EVT for women, black/Hispanic, Medicare/Medicaid beneficiaries and patients with lower household income.

Keywords: Acute Stroke, Treatment, Endovascular Therapy, Mechanical Thrombectomy, Stroke

Financial Disclosures: The authors had no disclosures.

Poster 77 & E-Poster 77 Endovascular Management of Acute Ischemic Stroke due to Common Carotid Artery Occlusion – Case Series Owais Khadem Alsrouji, MD¹, Alex Chebl, MD¹

¹Henry Ford Hospital, Detroit, Michigan, USA

Introduction:

Mechanical embolectomy (ME) has been validated for internal carotid occlusion(ICA) but not common carotid artery occlusion (CCAO), which is much rarer. Surgical intervention for CCAO had been reported but data on ME for CCAO is sparse. We present our experience treating CCAO with ME.

Methods:

We reviewed a prospectively collected database to identify consecutive patients who presented with AIS due to CCOA between 2014 and 2019. Patients were candidates for therapy based on published AIS guidelines and were treated via a transfemoral approach. ME with aspiration and stent-retrievers was first line treatment. Angioplasty and stenting were performed if an underlying severe stenosis was found, which were supplemented with IV GPIIb/IIIa administration.

Results:

A total of 7 patients were treated (mean age 70.6±20.9) within 24hrs of stroke onset with a mean NIHSS of 22.9±4.6. The CCA occlusion extended into the ICA in 6 (85%) patients, of whom 3 (43%) also had middle MCA occlusion. The etiology of the occlusion was atherosclerosis in 4 (57%) and atrial fibrillation in 3 (42%). Successful recanalization of the CCA was achieved in 100% of the patients- in all cases aspiration with an 8F sheath (43%) or an 8F guide (57%) was performed but 2 (28.6%) patients required angioplasty and stenting. Distal revascularization (TICI 2b-3) was achieved in 6 (85%) with 5(71%) requiring stent-retriever treatment. One (14%) patient was recanalized with proximal ICA aspiration. Good outcome (mRS£2) was achieved in 4 (57%) patients. One (14%) patient developed an asymptomatic SAH.

Conclusions:

Our results suggest that CCAO is rare and associated with severe neurological deficits but that it is amenable to endovascular intervention. Atherosclerotic occlusion was the most common cause requiring angioplasty and stenting in a small proportion of patients.

Keywords: Acute Ischemic Stroke Intervention

Financial Disclosures: The authors had no disclosures.

RESEARCH ABSTRACTS: PRIMARY CATEGORY – ISCHEMIC STROKE

Poster 52 & E-Poster 52

Criteria For Tissue Plasminogen Activator In Patients With Pre-Stroke Depression In Telestroke Settings

<u>Rachel M Shugart, Research Assistant</u>¹, Robyn A Moraney, Research Assistant¹, Mandy J Tate, Research Assistant¹, Nicolas S Poupore, Research Assistant¹, Thomas Nathaniel, Professor PhD¹

¹University of South Carolina School of Medicine Greenville, Greenville, South Carolina, USA

Introduction:

Thrombolysis therapy is the gold standard in acute ischemic stroke treatment, and rates of treatment with tPA in patients with comorbid depression has yet to be fully investigated. This study aims to examine the clinical risk factors associated with tPA inclusion and exclusion in acute ischemic stroke populations with depression.

Methods:

Binary logistic regression was used to determine risk factors that are associated with tPA use in a telestroke setting in patients with depression. Odds ratios (ORs) and 95% confidence intervals were used to predict the likelihood of patients with depression receiving thrombolysis treatment in a telestroke setting at a significance level of 0.05.

Results:

A total of 184 patients treated for acute ischemic stroke who had comorbid depression. 62 of which the patients were treated in a telestroke setting while 122 of them were treated in a non-telestroke setting. In the non-telestroke setting increasing age (OR = 1.064, 95% CI, 1.006-1.125, p = 0.029) was associated with receiving tPA while Caucasian race (OR = 0.119, 95% CI, 0.0168-0.908, P = 0.040), Systolic Blood Pressure (OR = 0.945, 95% CI, 0.906-0.985, P = 0.008), and Direct admission (OR = 0.028, 95% CI, 0.003-0.317, P = 0.004) were associated with not receiving tPA. In the telestroke setting, INR (OR = 0.016, 95% CI, 0.5.393, p = 0.163) was associated with both tPA inclusion and exclusion.

Conclusions:

The results demonstrate the clinical risk factors associated with comorbid depression and tPA treatment in a telestroke versus non-telestroke setting.

Keywords: Ischemic Stroke, Acute Ischemic Stroke Intervention, TPA

Financial Disclosures: The authors had no disclosures.

Poster 53 & E-Poster 53

Thrombolysis Therapy In Patients With Depression: Impact On Stroke Severity

<u>Rachel M Shugart, Research Assistant</u>¹, Robyn A Moraney, Research Assistant¹, Mandy J Tate, Research Assistant¹, Nicolas S Poupore, Research Assistant¹, Thomas Nathaniel, Professor PhD¹

¹University of South Carolina School of Medicine Greenville, Greenville, South Carolina, USA

Introduction:

Factors that link comorbidities of stroke in patients with pre-stroke depression and severity of stroke based on clinical evaluation are not well understood. This study aims to examine the relationship among clinical factors in patients with pre-stroke depression and severity of the acute ischemic stroke based National Institutes of Health Stroke Scale.

Methods:

This study analyzed acute ischemic stroke patients that were admitted to regional hospitals between January 2010 and June 2016. Binary logistic regression was performed to identify risk factors that correlate with an NIHSS score of greater than 7 for rtPA treated patients with depression. Odds ratios (ORs) and 95% confidence intervals were used to predict the probability of having an NIHSS score above 7 in association with thrombolysis treatment in comorbid depression at a significance level of 0.05.

Results:

Of the 5,469 patients diagnosed with acute ischemic stroke, 721 patients had comorbid depression. A total of 205 patients diagnosed with pre-stroke depression received tPA of which 108 had an NIHSS score greater than 7. Four factors that made patients treated with tPA and with comorbid depression more likely to have an NIHSS score greater than 7 were found to be female sex (OR = 2.545, 95% CI, 1.167-5.553, P = 0.019) , having coronary artery disease (OR = 2.935, 95% CI, 1.296-6.645, P=0.01), heart rate (OR = 1.025, 95% CI, 1.001-1.049), and ambulation status (OR = 2.161, 95% CI, 1.076-4.343).

Conclusions:

The findings of this study suggest that being female, having coronary artery disease, heart rate, and ambulation improvement are associated with higher NIHSS score in patients with depression who received tPA. Antidepressant use and direct admission were associated with a lower NIHSS score in patients with depression who received tPA.

Keywords: Ischemic Stroke, NIHSS, TPA

Financial Disclosures: The authors had no disclosures.

Poster 54 & E-Poster 54

Utilization of IV-tPA And Endovascular Therapy In Acute Ischemic Stroke Pregnant Population <u>Smit Patel, MD, MPH¹</u>, Jussie Lima, MD¹, Martin Ollenschleger, MD¹

¹Hartford Hospital, Hartford, Connecticut, USA

Introduction:

Ischemic Stroke is devastating when it occurs in a young woman who tries to start a family. Most concerning is the lack of data regarding the safety of IV-tPA and EVT in pregnancy-related stroke. Pregnancy is considered a relative contraindication for IV-tPA administration as per AHA guidelines (Class IIb) and no data is available regarding the safety of EVT. Our study hypothesis is to identify utilization of IV-tPA, EVT and associated outcomes in a pregnant population.

Methods:

We analyzed the data from the Nationwide Inpatient Sample (NIS) from the years 2005 to 2014. All pregnant patients with reproductive age between 15 to 45 years (N=73.93 million) were identify using ICD 9 CM codes. Demographic characteristics, discharge disposition, utilization of IV-tPA and EVT were used as outcomes measures. We performed a descriptive analysis using student's t-test and chi-square test to analyze the data.

Results:

Total 5,106 had diagnosed with a pregnancy-related stroke. From them, 1.8% (N=92) treated with IV-tPA and 0.6% (N=30) treated with EVT. Baseline characteristics of stroke pregnant patients mean age was (Mean±SE) 29.3±0.25, 50.3% in 26-35 years, race including White 34.9%, Black 24.1%, and Hispanics 16.3%. Patients' comorbidities were preeclampsia-eclampsia condition 42.5%, preexisting hypertension 22.4%, hematological disorders 22.1%, inflammatory disorders 15.3%, migraine 9.7%, drug abuse 7.7%, hyperlipidemia 6.8%, diabetes 5.0%, and cervical dissection 3.9%. Among IV-tPA use (N=92), 73.6% were discharged to home with/without services, 21.7% were discharged to the facility and 4.7% have died. While in EVT use (N=30), 83.4% were discharged to home with/without services, and 17.0% have died.

Conclusions:

The good outcomes were observed in patients treated with IV-tPA and EVT as majority were discharged to home and less mortality was reported. There is little data available regarding the safety of IV-tPA and EVT in prior literature since the pregnancy was excluded from major trials considering safety concerns.

Keywords: Acute Stroke, Mechanical Thrombectomy, Cerebrovascular Disease

Financial Disclosures: The authors had no disclosures.
Poster 56 & E-Poster 56

Anti-hypertensive Medications Effect on Acute Ischemic Stroke Patients Based on Initial Severity and Thrombolytic Therapy

Bridgette A Allen, BSc¹, Nicolas Poupore, BSc², Thomas I Nathaniel, Ph.D.²

¹Clemson University, Clemson, South Carolina, USA; ²USC School of Medicine Greenville, Greenville, South Carolina, USA

Introduction:

The purpose of this study is to determine the prognostic value of the initial neurological status and change as determined by NIHSS to predict the effect of anti-hypertensive (anti-HTN) on treatment outcome after thrombolytic therapy in acute ischemic stroke.

Methods:

Binary logistic regression was performed to identify clinical risk factors that result in a NIHSS score of greater than 7 for both rtPA treated groups. Odds ratios (ORs) and 95% confidence intervals were used to predict the odds of having a higher NIHSS score in association with thrombolysis treatment in anti-HTN therapy at the significance level of 0.05. Hosmer-Lemeshow test was used to test for multicollinearity and possible interactions among the independent variables.

Results:

A total of 5,469 patients with AIS were identified. Within that population, 935 patients were treated with rtPA and were taking an anti-HTN medication; whereas, 382 patients were treated with rtPA and not taking an anti-HTN medication. In an adjusted analysis, patients with Increasing Age (OR=1.035, 95% CI, 1.022-1.049, P<0.001), were Female ((OR = 1.630, 95% CI, 1.182-2.248, P=0.002), and a History of Substance Abuse (OR = 2.315, 95% CI, 1.107-4.842, P = 0.026) were associated with an NIHSS score > 7 for the rtPA group with anti-HTN medication. The rtPA group without anti-HTN medications observed Increasing Age (OR = 1.021, 95% CI, 1.004-1.038, P = 0.015) and Improvement in Ambulation (OR = 1.762, 95% CI, 1.077-2.882, P = 0.024) were more likely to be associated with an NIHSS score > 7.

Conclusions:

In addition to baseline stroke severity, our model identifies specific clinical risk factors as predictors of outcomes in ischemic stroke patients with rtPA and anti-HTN medications.

Keywords: Acute Stroke, Ischemic Stroke, Thrombolytics

Financial Disclosures: The authors had no disclosures.

Poster 58 & E-Poster 58

There is No Difference In Safety/Efficacy with Tirofiban/Eptifibatide for Patients treated with Tandem Lesions

<u>Hari Movva, Department of Neuroscience</u>¹, Rani Rabah, Department of Neuroscience², Wondwossen Tekle, Department of Neuroscience¹, Alexandros Georgiadis, Department of Neuroscience³, Ameer Hassan, Department of Neuroscience¹

¹Valley Baptist Medical Center, University of Texas at Rio Grande Valley, Harlingen, USA; ²Valley Baptist Medical Center, Harlingen, USA; ³Mcallen Medical Center, McAllen, Texas, USA

Introduction:

Glycoprotein IIb/IIIa inhibitor use in acute ischemic stroke (AIS) during mechanical thrombectomy (MT) and acute stenting and/or angioplasty is a topic consistently debated due to concerns over safety and efficacy. Tirofiban is a glycoprotein IIb/IIIa used throughout the world now more commonly used during MT. We report the analysis of all AIS patients treated with Eptifibatide + MT vs. Tirofiban + MT.

Methods:

Using a prospectively collected endovascular database at a CSC between 2013-2019 workflow and outcomes were recorded. Patients given Tirofiban and patients given Eptifibatide were analyzed to obtain baseline demographics, modified Ranking Scale (mRS) at discharge and 90 days follow up, pre and post thrombolysis in cerebral infarction (TICI), mortality rate, and hemorrhage rates.

Results:

A total of 571 MT patients were treated, of those, 89 patients (average age 69.25 ± 14.21 , 25.84% female) were tandem lesions treated with a GpIIb/IIIa inhibitor. Analysis of 40.45% (36/89) patients treated with Tirofiban + MT and 59.55% (53/89) patients with Eptifibatide was performed. There was no statistically significant difference in NIHSS upon admission. (p=.441). Four patients (11.11%) in the Tirofiban + MT cohort had symptomatic hemorrhage versus four patients (7.55%) in the Eptifibatide + MT cohort (p=.564). There was no significant difference in mortality (p=.573) or final recanalization (p=.678) between the two cohorts.

Conclusions:

Tirofiban use in MT does not increase the risk of symptomatic hemorrhages or mortality compared to Eptifibatide. Large prospective studies are warranted to confirm the safety/efficacy of Tirofiban use in MT patients with tandem lesions.

Keywords: Acute Ischemic Stroke Intervention, Mechanical Thrombectomy, ICH, MRS, Recanalization

Financial Disclosures: The authors had no disclosures.

Poster 59 & E-Poster 59

Gender Difference In Pre-Stroke Depressive Patients: Evaluation of Functional Outcomes

<u>Mandy J Tate, Research Assistant</u>¹, Rachel M Shugart, Research Assistant¹, Robyn A Moraney, Research Assistant¹, Leanne E Brechtel, Research Assistant¹, Brice Blum, Research Assistant¹, Thomas Nathaniel, PhD Research Professor¹

¹University of South Carolina School of Medicine - Greenville, Greenville, South Carolina, USA

Introduction:

This study investigates the differences seen in functional improvement post-stroke in male and female pre-stroke depressive patients and identifies comorbidities associated with improvements in functional outcomes of rtPA treated pre-stated cohorts.

Methods:

Multivariate statistical analysis was used to analyze data collected from a telestroke registry. Binary logistic regression was performed to identify clinical risk factors that resulted in improved functional outcomes for all rtPA treated groups. Odds ratios (ORs) and 95% confidence intervals were used to predict the odds of improved functional outcome in association with thrombolysis treatment in prestroke depressive patients at the significance level of 0.05. Hosmer-Lemeshow test was used to test for multicollinearity and possible interactions among the independent variables.

Results:

352 pre-stroke depressive patients were selected for this study, with 171 of these patients receiving rtPA treatment. Improved outcomes in pre-stroke depressive males recorded clinical factor associations such as a history of a previous stroke (OR = 1.271 - 40.533, P = 0.026), NIHSS score (OR = 1.004 - 1.191, P= 0.04), cholesterol reducing medication (OR = 1.546 - 45.862, P = 0.014), and serum creatinine levels (OR= 1.002 - 3.298, P= 0.049). Females with improved outcomes were more likely to be associated with lower NIHSS score (OR= 1.031 - 1.148, P= 0.002), and taking antidepressants prior to hospital admission (OR= 1.188 - 17.424, P= 0.027).

Conclusions:

In pre-stroke depressive patients, gender seems to play a role in determining functional outcomes and associative clinical factors. Future studies that investigate these factors associated with gender & post-stroke functional outcomes are needed to further expound upon the results of this study.

Keywords: TPA, Acute Stroke, Ischemic Stroke, Stroke, Thrombosis

Financial Disclosures: The authors had no disclosures.

Grant Support: Fullerton Research Grant

Poster 60 & E-Poster 60

Emergent Use of Ticagrelor in Neuro-Endovascular Interventions: Efficacy and Safety

<u>Song J Kim, MD¹</u>, Raul G Nogueira, MD², Olivia Morgan, PharmD³, Katleen Chester, PharmD³, Alhamza Al-Bayati, MD², Diogo C Haussen, MD²

¹Emory University School of Medicine, Atlanta, Georgia, USA; ²Emory University School of Medicine; Marcus Stroke & Neuroscience Center, Atlanta, Georgia, USA; ³Marcus Stroke & Neuroscience Center, Atlanta, Georgia, USA

Introduction:

Ticagrelor (P2Y12-receptor antagonist) swiftly achieves steady-state after bolus with low rates of platelet resistance, rendering it an ideal agent for emergent neurointerventions. We aimed to evaluate the safety and efficacy of emergent Ticagrelor administration.

Methods:

This was a single-center retrospective series of consecutive patients who received intraprocedural/periprocedural(±30 minutes) Ticagrelor 120mg-180mg load for: 1)urgent flow-diverter embolization of ruptured cerebral aneurysms or 2)acute ischemic stroke treated with endovascular therapy due to intracranial/extracranial steno-occlusive disease.

Results:

59 patients were identified (median age 63years[IQR52-70];66% male). 90% received aspirin, 42% IV heparin bolus(median 3000u), and 63% IIbIIIa inhibitors (16 Tirofiban and 21 Abciximab; 32 full or half cardiac dose, and 6 <half dose). After screening for appropriate PRU collection times in IIbIIIa inhibitor use, 97%(30/31) achieved therapeutic PRU(<208) at first-measured median PRU=50; 5 patients had PRU<10. Five underwent flow-diversion of ruptured aneurysms; no recurrent hemorrhages/thromboembolic events recorded. Fifty-four underwent ischemic stroke intervention (median NIHSS=15, ASPECT=9, intravenous tPa=6). In 29 ICAD patients, 12 received thrombectomy, 13 angioplasty, and 16 stenting. In 25 extracranial steno-occlusion patients, 11 were tandem occlusions, 14 had exclusive extracranial disease; 5 underwent angioplasty and 20 stenting. Successful reperfusion(eTICl2b/3) was achieved in 95%. Three patients had vessel reocclusion (PRU ranged 1-50). Six (10%) experienced serious hemorrhagic complications: 3 fatal intracranial hemorrhage<48h of intracranial stenting(n=2) and extracranial stenting(n=1) requiring multimodality antithrombotics. There were 3 gastrointestinal bleeds>48h requiring transfusions. All 6 patients with bleeding received stents (p=0.035) and all received half/full cardiac bolus of IIbIIIa (p=0.038). When IIaIIIb were combined with heparin, bleeding risk was higher (p=0.063;odds ratio 5.62 [CI=0.96-32.9]). Overall, PRU was not correlated with clinical ischemic or bleeding event (Spearman's -0.087).

Conclusions:

Procedural loading of Ticagrelor may be an appropriate option in neurointervention in order to achieve reliable and fast platelet inhibition. Multimodality antithrombotic use should be carefully considered in view of the hemorrhagic potential.

Keywords: Antiplatelet, Platelet Testing, Endovascular Therapy

Financial Disclosures: The authors had no disclosures.

Poster 65 & E-Poster 65

High Correlation Between Multiphase Collateral Scores and CT Perfusion Parameters in Large Vessel Occlusion Strokes

<u>Leonardo Pisani, MD</u>¹, Catarina Perry, MD², Mahmoud Mohammaden, MD¹, Marta Gadea, MD³, Feras Akbik, MD¹, Diogo Haussen, MD¹, Alhanza Al-Bayati, MD¹, Aaron Anderson, MD¹, Samir R Belagaje, MD¹, Michael Frankel, MD¹, Raul Nogueira, MD¹

¹Emory University, Atlanta, Georgia, USA; ²Centro Hospitalar Universitário Lisboa Central, Lisbon, Portugal; ³Hospital Vall d'hebron, Barcelona, Spain

Introduction:

Computed tomography angiography (CTA) and CT Perfusion are currently cornerstones for treatment selection in Large Vessel Occlusion Strokes (LVOS). We aim to study the correlation between Multiphase Collateral Scores and CT Perfusion Parameters and assess whether mCTA can reliably replace CTP as a selection tool.

Methods:

Retrospective analysis of AIS patients between February 2018-June 2019 was performed. Patients with (1) isolated M1 or Intracranial ICA LVOS, and (2) with presence of multiphase CTA and CT Perfusion scans on admission were included. Images were blindly graded for ESCAPE collateral scores by a neurologist and neuroradiologist and consensus the reading was compared with CTP values using a commercial perfusion software (RAPID, IschemaView). All available CTP parameters were included (Tmax>4s, Tmax>6s, Tmax>8s, Tmax>10s, rCBF<20%, rCBF<30%, rCBF<34%, rCBF<38%, rCBV<34%, rCBV<34%, rCBV<38% and rCBV<42%). Baseline ischemic core thresholds typically applied for patient selection (rCBF<30% <30ml, <50mL, <70mL) were assessed in patients with poor collateral grades.

Results:

A total of 109 patients met the study inclusion criteria. Mean age and NIHSS on arrival were 67.17±16.54 and 16.80±6.90. Median time from stroke onset to imaging was 389.50 (IQR222.75-802) minutes. Consensus ESCAPE collateral scores were graded as poor in 20 patients (18.3%), intermediate in 73 (67%), and good/excellent in 16 (14.6%). Tmax, rCBF and rCBV median values were lower with the increase of collateral score with a moderate to strong correlation (p<0.01), having rCBV<38% as strongest correlation [rs=0.661,p<.001]. Out of the patients with poor collateral grades (n=20), 18 (90%), 17 (85%), and 17 (85%) showed rCBF<30% greater than 30mL, 50mL, and 70mL, respectively (p<0.001).

Conclusions:

ESCAPE mCTA collateral scores are strongly correlated with CT perfusion parameters in LVOS patients. While poor collaterals are highly predictive of high CBF<30% values many patients with poor collaterals are still eligible for endovascular reperfusion on the basis of baseline ischemic core volumes.

Keywords: Stroke, Acute Ischemic Stroke Intervention, Angiographic Ct, Angiographic Ct Perfusion, Collateral

Financial Disclosures: The authors had no disclosures.

Poster 67 & E-Poster 67

Multiphase versus Single-phase CT Angiography for the Characterization of Collateral Flow in LVO Stroke

<u>Leonardo Pisani, MD</u>¹, Catarina Perry, MD², Mahmoud Mohammaden, MD¹, Marta O Gadea, MD³, Diogo C Haussen, MD¹, Alhanza Al-Bayati, MD¹, Nicolas A Bianchi, MD¹, Nirav R Bhatt, MD¹, Michael Frankel, MD¹, Raul G Nogueira, MD¹

¹Emory University, Atlanta, Georgia, USA; ²Centro Hospitalar Universitário de Lisboa Central, Lisboa, Portugal; ³Hospital Vall d'Hebron, Barcelona, Spain

Introduction:

Malignant collateral profile significantly correlates with poorer outcomes and may be used for patient selection criteria in Large Vessel Occlusion Strokes (LVOS). It postulated that Multiphase CTA (mCTA) might be more accurate than Single-phase CTA (sCTA) for collateral grading. However, this comes at the cost of additional time and radiation. We aim to determine whether the characterization of bad collaterals is significantly different between single-phase and multiphase CTA.

Methods:

Retrospective analysis of 109 AIS with M1 or intracranial ICA occlusion was performed. Collateral scores were blindly evaluated by a neurologist and a neuroradiologist on sCTA using modified Tan method and on mCTA using ESCAPE method. A consensus on mCTA was used as ground truth. Hounsfield units (HU) of the torcula and torcula/open ICA ratio were used for assessing arteriovenous weighting/ timing of the scan. Threshold for venous weighting was set (<180 HU on torcula) for labeling over-arterialized scans that would presumably had not allow enough time for collateral filling. We analyzed the frequency that the characterization of bad collaterals was changed due to the later CTA phases.

Results:

Mean age and NIHSS on arrival were 67.17±16.54 and 16.80±6.90. A total of 23 patients (21.1%) had over-arterialized scans. Consensus multiphase collateral scores were bad in 20 patients (18.3%), intermediate in 73 (67%), and good/excellent in 16 (14.6%). Disagreement in terms of poor collaterals between the single- and multiphase CTA modalities occurred in only 13 cases (11.9%). Disagreement scans were significantly more arterialized (54.09% versus 64.76% on median torcula/open ICA ratio) (p=0.042) and had significant lower median HU in the torcula (172.42 IQR124-212 vs 226.26 IQR184-267) (p=0.009). Six out of 13 (46.2%) disagreements met the definition of over-arterialized scans.

Conclusions:

Disagreements between sCTA and mCTA are uncommon (~12% cases) particularly in the setting of optimal contrast opacification of the torcula.

Keywords: Acute Stroke, Angiographic Ct, Collateral, Endovascular Therapy, Imaging

Financial Disclosures: The authors had no disclosures.

Poster 68 & E-Poster 68

First Pass Reperfusion Versus Non-First Pass but Complete Reperfusion in Acute Stroke Thrombectomy

<u>Mahmoud H Mohammaden, MD, MSc¹</u>, Catarina Perry, MD², Leonardo Pisani, MD¹, Marta Olive-Gadea, MD³, Alhamza R Al-Bayati, MD¹, Diogo C Haussen, MD¹, Bernardo Liberato, MD¹, Nicolas Bianchi, MD¹, Michael Frankel, MD¹, Raul G Nogueira, MD¹

¹Department of Neurology,Emory University School of Medicine, Grady Memorial Hospital, Atlanta, Georgia, USA; ²Neuroradiology department, Centro hospitalar Universitario Lisboa central, Lisboa, Portugal; ³Department of Neurology, Hospital Vall d'Hebron, Barcelona, Spain

Introduction:

The speed and completeness of reperfusion strongly correlate with functional outcome. First Pass Reperfusion (FPR) has been established as a key performance metric in mechanical thrombectomy (MT). However, most previous analyses compared first-pass complete reperfusion (mTICl2c-3) versus non-first pass >50% reperfusion (mTICl2b-3). As such, the better results of FPR could be confounded by the inclusion of non-FPR patients with incomplete reperfusion. Herein, we analyze the predictors and effects of FPE in a cohort limited to fully reperfused patients.

Methods:

A prospective MT database from January 2012 to May 2019 was reviewed. Consecutive acute stroke patients with isolated occlusion of the intracranial internal carotid artery and/or M1 segment of middle cerebral artery who underwent MT with complete reperfusion (mTICl2c-3) were included in the analysis. FPR was defined as achievement of mTICl2c-3 after a single pass of any MT device. Uni- and multivariate analyses were performed to identify the predictors FPR and good outcome at 90 days (modified Rankin Scale, mRS: 0-2).

Results:

A total of 409 patients were included in the analysis (median age, 66 years; baseline NIHSS 17). FPR was achieved in 235 (57.5%) patients. As compared to non-FPR patients, those with FPR had significantly higher baseline ASPECTS (p= 0.03) and shorter procedure duration (median 34 vs. 66 minutes, p <0.001). Patients with FPR showed significantly higher rates of good outcome (58.3% vs. 43.7%, p= 0.003) and mortality (13.6% vs. 21.3%, p= 0.04) at 90 days. FPR (OR, 1.58; 95% CI [1.016-2.445], p= 0.04) and ASPECTS (OR,1.31; 95% CI [1.14-1.5], p <0.001) were the only independent predictors of 90-day good outcome on multivariate analysis.

Conclusions:

The FPR benefit holds true even when comparing it to a non-FPR cohort comprised exclusively by fully reperfused patients. FPR and higher baseline ASPECTS are the strongest predictors of good outcome after anterior circulation MT with full reperfusion.

Keywords: Acute Ischemic Stroke Intervention, Aspects, TICI

Financial Disclosures: The authors had no disclosures.

Poster 72 & E-Poster 72

Vascular Imaging Misdiagnosis in Patients with Symptomatic Carotid Web

<u>Ehizele M Osehobo, M.D., M.Sc.</u>¹, Sitara Koneru Achanti, M.D.¹, Catarina Perry da Câmara, M.D.¹, Alhamza R Al-Bayati, M.D.¹, Raul G Nogueira, M.D.¹, Fadi Nahab, M.D.¹, Bernardo Liberato, M.D.¹, Michael Frankel, M.D.¹, Diogo Haussen, M.D.¹

¹Emory University School of Medicine, Atlanta, Georgia, USA

Introduction:

Carotid web (CaW) is becoming an increasingly recognized cause of ischemic stroke due to its thromboembolic potential. However, it remains frequently overlooked or misdiagnosed as a dissection or an atherosclerotic plaque on vascular imaging. We aim to retrospectively evaluate the rates of misdiagnosis of different vascular imaging modalities for the identification of CaW.

Methods:

We performed retrospective analysis of a database of patients identified with CaW from 2014 to 2019 in a comprehensive stroke center (CSC). Vascular imaging radiological reports were reviewed for the diagnosis of CaW. Symptomatic CaW was defined as an ipsilateral web characterized by consensus Computerized Tomography Angiography (CTA) read, which had a negative stroke work-up per best practice for embolic stroke of undetermined source(ESUS). Cases with more than one potential stroke etiology were excluded.

Results:

We found 49 patients who have a symptomatic CaW by CTA. Seventeen had bilateral CaW accounting for 66 total CaW. All patients had (CTA) of the head and neck as part of an acute stroke workup. 35(71%) patients underwent Digital Subtraction Angiography (DSA), 17(34%) patients received Carotid Duplex Ultrasound (CDUS), and 7(14%) patients underwent Magnetic Resonance Angiography (MRA) without contrast. 60 CaW were imaged by CTA at the CSC and CaW diagnosis was reported in 42(70%), while 8 CaW were imaged by CTA at referring sites and none were reported (0%;p=0.02). DSA imaged 36 webs at the CSC and accurately reported 32(89%) of them, while 1 CaW was imaged by DSA at a referring site and was not reported. CDUS imaged 29 CaW and accurately reported 7(24%) of them, while non-contrasted MRA imaged 7 CaW and accurately reported 1(15%) web.

Conclusions:

CaW is commonly overlooked in facilities with lower levels of cerebrovascular certification. DSA was found to have better performance as compared to CDUS and non-contrasted MRA for CaW diagnosis.

Keywords: Carotid, Imaging, Diagnostic Neuroradiology, Endovascular

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS: PRIMARY CATEGORY - SUBARACHNOID HEMORRHAGE

Poster 79 & E-Poster 79

Endovascular treatment of Raptured tiny cerebral aneurysms, feasibility and cost effectiveness in low income country

<u>Mohamed A Attia, Neurology fellow</u>¹, Ossama Y Mansour, Professor of Neurology², Rasha A El Kabany, Professor of neurology³, Mostafa S Melake, A.professor of neurology³

¹Alexandria university, Alexandria, Egypt; ²Alexandria university hospital, Alexandria, Egypt; ³Menoufia university, Menoufia, Egypt

Introduction:

Surgical clipping (SC) and endovascular coiling (EC) techniques are established treatment modalities for ruptured cerebral aneurysm. Tiny aneurysm (\leq 3 mm.) remains challenging to treatment due to the high risk of IOR.

Methods:

Prospectively, Between April 2014 and Aplril 2019, 38 consecutive cases with subarachnoid hemorrhage due to ruptured tiny cerebral aneurysms were analyzed.

Results:

Thirty-eight patients were included; Patients' mean age (49.6 years). 28 patients had EC, and 10 patients had SC. Mean Length of stay without or with ventilator for the coiled group (mean = 4.57 days) and (mean = 3.11 days) consequently. For the clipping group was (mean = 9.2 days) and (mean = 12.8 days) consequently. Occlusion rate (Meyers Occlusion grading scale) of the aneurysms for the 28 patients treated with EC was grade 2 in (n=21, 75%) and grade 3 in (n=7, 25%). At Follow up period, Occlusion rate was ameliorated from grade 2 to 3 in (n=6 30%). While in clipped aneurysms, occlusion rate was grade 2 in (n=5, 50%) and grade 3 in (n=5, 50%). At Follow up, Occlusion rate was regressed to grade 2 in (n=8, 40%). In the coiling group, total cost was ranging from (23,000 to 87,500 EP – Mean 50,730). In comparison to the clipping group, total cost was ranging from (82,500 to 122,000 EP – Mean 103,750).

Conclusions:

in low flow centers , Endovascular coiling by simple coiling or balloon assisted coiling for tiny cerebral aneurysms ≤ 3 mm might be feasible, durable and more cost effective than surgical clipping

Keywords: Subarachnoid Hemorrhage, Aneurysm, Coiling, Endovascular, Balloon Assisted

Financial Disclosures: The authors had no disclosures.

RESEARCH ABSTRACTS: PRIMARY CATEGORY – SYSTEMS OF STROKE CARE

Poster 80 & E-Poster 80

Stroke Systems of Care and Different Measures to Improve Stroke Patient Care <u>Robyn A Moraney, Research Assistant</u>¹, Mandy Tate, Research Assistant¹, Rachel Shugart, Research Assistant¹, Thomas Nathaniel, Research Faculty¹

¹University of South Carolina School of Medicine-Greenville, Greenville, South Carolina, USA

Introduction:

This study investigates the current state of stroke care including improvement in door-to-needle time, tPA administration and systems in place to care for patients with acute ischemic stroke. We analyzed different stroke practices, clinical risk factors, and treatment outcome for tPA. We identified specific areas that need improvement to improve stroke patient care.

Methods:

A computer-aided retrospective search on acute ischemic stroke care was preformed based on research completed since FDA approval of tPA in 1996 to current stroke care treatment.

Results:

With protocols in place to improve door-to-needle time by decreasing emergency transport travel time, interfacility communication, and transport protocols, patients in rural setting may not receive tPA within the advised 4.5-hour administration window. Our findings indicate that telestroke has the capability to reduce the door to needle time. We also found that tPA administration increased from 0.09% to 5.2% between 2004 to 2009 and its use has only increased since because of its effective improvement of function outcomes for post-stroke patients. These advances are assessed via methods that include not only door-to-needle times, but other indicative measures that include individual patient function outcomes in terms of ambulation and patient transfer rates to and from hubs and spokes.

Conclusions:

These implementations of telestroke have led to improvements in stoke systems of care by bringing the hospital to the patients, as more and more individuals are able to seek care in those underserved and rural areas which otherwise would be clinically neglected.

Keywords: TPA, Acute Ischemic Stroke Intervention, Door To Needle, Ischemic Stroke, Thrombolytics

Financial Disclosures: The authors had no disclosures.

Grant Support: Fullerton Grant

Poster 81 & E-Poster 81

In-hospital Strokes Transferred to a Comprehensive Stroke Center for Mechanical Thrombectomy Rahul R Rao, M.D.¹, Shashvat M Desai, M.D.¹, Ashutosh P Jadhav, M.D., Ph.D.¹

¹UPMC Stroke Institute, Pittsburgh, Pennsylvania, USA

Introduction:

Stroke outcomes in the setting of large vessel occlusions are poor in the absence of timely recanalization. Delays are particularly significant in patients who experience in-hospital stroke (IHS) or inter-facility transfer. We sought to understand clinical outcomes for those patients with IHS who were transferred for mechanical thrombectomy.

Methods:

After IRB approval, a retrospective analysis of patients who suffered IHS at a primary stroke center and subsequently transferred to a comprehensive stroke center for acute intervention from the period of 2014-2018.

Results:

Among 91 patients identified, average age was 74 (SD 11.6). 83.5% (n=76) of patients had a baseline mRS of 0-2. 36.3% (33) patients had ICA, 40.7% (37) had M1, 6.6% (6) had M2, and 11% (10) had basilar occlusions, respectively. Average time of last seen well (TLSW) to recognition, start of transfer, and groin puncture was 72 (SD 123.7, n=77), 223 (SD 118.6, n=59), and 247 minutes (SD 136.6, n=66) minutes, respectively. Mean time from recognition to start of transfer was 156 minutes (n=59). 90% of patients had successful recanalization (TICl2b or better). Average NIHSS upon arrival was 17.3 (SD 6.9). 31% had early improvement (NIHSS 0-1 or NIHSS decrease 8 or more) and 15% had significant NIHSS deterioration (increase of 4 or more points) at 24 hours after recanalization, respectively. 11% of patients had symptomatic ICH or significant parenchymatous hematoma (PH-2). Among the 77 patients with good baseline (mRS 0-2), 11.7% had a mRS of 0-2 at 90 days, 22.1% had mRS of 0-3, while 6.5% were lost to follow-up. All-cause mortality at discharge was 32% and 46.5% at 90 days.

Conclusions:

In-hospital stroke patients at spoke facilities suffer significant delay in stroke recognition and transfer to hub facility for neurothrombectomy. Rates of functional independence are low despite thrombectomy. Further studies are required to find potential areas of improvement.

Keywords: Functional Recovery In Stroke, Mechanical Thrombectomy, Acute Ischemic Stroke Intervention, Door To Groin Puncture, NIHSS

Financial Disclosures: The authors had no disclosures.

Poster 82 & E-Poster 82

Stroke Center Designation, Certifying Organizations and Patent Outcomes in the United States <u>Nabeel A Herial, MD, MPH</u>¹, Joshua Weinberg, MD¹, Shyam Majumdar, MD¹, Jane Khalife, MD¹, Satish Gaddam, MD², Michael R Gooch, MD¹, Pascal Jabbour, MD¹, Stavrapoula Tjoumakaris, MD¹, Robert Rosenwasser, MD¹

¹Thomas Jefferson University, Philadelphia, Pennsylvania, USA; ²Lonestar Neurology, Texas health Presbyterian Hospital, Plano, Texas, USA

Introduction:

Stroke is a leading cause of morbidity, mortality, and healthcare costs in the US. Improving patient outcomes is largely dependent on timely delivery of quality stroke care. Standardized care offered through implementing established protocols derived from best practice guidelines is proven to improve patient care and outcomes. We present data on available certifications, certifying organizations, eligibility criteria and reported differences in stroke care and outcomes.

Methods:

Review was conducted of current published data, available information on the world wide web and public domain, and direct communications with organizations. Data on hospital eligibility criteria for certification, available levels of certification, certification trends and patient outcomes by certification organizations are presented.

Results:

The Joint commission (TJC), DetNorske Veritas (DNV-GL), Healthcare Facilities Accreditation Program (HFAP), and State Departments of Health are the primary certifying organizations of stroke centers. Four levels of stroke center certifications are available with each level serving a distinct role within the stroke systems of care. TJC started stroke certification of hospitals as PSC in 2003, CSC in 2012, ASRH in 2015 and TSC in 2018. DNV GL certified PSC in 2009, CSC on 2012, ASR in 2014, and primary plus stroke center (PSC+) in 2018. HFAP offers similar levels of certification. Available reports suggest PSCs (TJU >1050, DNVGL >150, HFAP >50) and ~200 CSCs (TJU >80, DNVGL >70, HFAP >6). DTN times, alteplase use, and in-hospital mortality were different between certifying organizations.

Conclusions:

Although certifying organizations have a similar 4 level graded stroke center designation of hospitals, the requirements for certification are not standard across organizations. Dissimilarities exist in performance measures, patient volume requirements, healthcare provider experience criteria, research requirements, and site survey frequency. Despite variations, stroke center certification was associated with improved guideline concordance. Evidence suggests improved patient outcomes with care at certified stroke centers regardless of the certifying organization.

Keywords: Stroke, Epidemiology

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS: PRIMARY CATEGORY - VASOSPASM

Poster 83 & E-Poster 83

Mechanical Thrombectomy for Acute Ischemic Stroke in Cocaine Users

<u>Mithilesh Siddu, MD¹</u>, Muhammad Z Memon, MD¹, Marina Kushnirsky, MD¹, Marie C Brunet, MD¹, Robert M Starke, MD², Amer M Malik, MD², Sebastian Koch, MD², Dileep R Yavagal, MD²

¹Jackson Memorial Hospital/University of Miami, Miami, Florida, USA; ²University of Miami Hospital, Miami, USA

Introduction:

Cocaine causes cerebral vasospasm, vasculitis, enhanced platelet aggregation, and hypertension with altered cerebral autoregulation. The optimal treatment for large vessel occlusion due to cocaine-induced vasospasm remains unknown. Mechanical thrombectomy (MT) poses a unique challenge, and reports of successful MT are not well published.

Methods:

We report three patients with a common history of cocaine abuse who underwent MT for MCA occlusions with subsequent failed or recalcitrant recanalization or vessel re-occlusion due to severe vasospasm. Two patients initially had good revascularization but then developed severe vasospasm and reoccluded and the remaining patient had persistent vasospasm, but recanalization was achieved. Rescue therapy either with balloon angioplasty and stent placement and intraarterial vasodilator was used in all three patients which were completely unsuccessful in two of them.

Results:

2 of the 3 patients were women.All had proximal M1 occlusion.All three patients had large hemispheric strokes post thrombectomy and one patient was discharged to rehab with mRS of 4 at 3 months followup. The remaining two patients underwent hemicraniectomy for malignant cerebral edema; however only one them survived with mRS of 5 at 3 months.

Conclusions:

In this case series, cocaine induced vasospasm led to unsuccessful recanalization and frequent reocclusions in patients undergoing mechanical thrombectomy with poor outcomes. Further studies are needed to better delineate the therapeutic interventions in patients with acute large vessel occlusions secondary to cocaine use.

Keywords: Vasospasm

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS-E-Poster ONLY: PRIMARY CATEGORY - CASE REPORTS

E-Poster 7

Embolic Protection Using Balloon Catheters For Subclavian Artery Revascularization With Dual Transfemoral and Transradial Access

<u>Rami Fakih, MD</u>¹, Aldo A Mendez Ruiz, MD¹, Khaled Asi, MD¹, Cynthia Zevallos, MD¹, Darko Quispeorozco, MD¹, Kaustubh Limaye, MD¹, James Rossen, MD¹, Edgar Samaniego, MD¹, Santiago Gutierrez Ortega, MD¹, Sudeepta Dandapat, MD¹

¹University of Iowa Hospitals and Clinics, Iowa City, Iowa, USA

Introduction:

Patients with an obstructive subclavian artery (SA) may exhibit symptoms of vertebrobasilar insufficiency and/or upper extremity claudication. These constellation of symptoms are due to the subclavian steal (SS) phenomena. Endovascular treatment with stent assisted percutaneous transluminal angioplasty (SAPTA) demonstrates significantly lower percentage of intraoperative and postoperative complications in comparison with open surgery. There is risk of distal intracranial embolization through the ipsilateral vertebral artery during SAPTA. We describe a novel technique of distal embolic protection using balloon catheters for SA revascularization with dual transfemoral and transradial access.

Methods:

We performed a retrospective review of our prospectively collected neuroendovascular database from 2014 to June 2019 to identify patients with SS who underwent SAPTA with the above-mentioned approach.

Results:

We identified 3 cases of symptomatic subclavian artery obstruction/stenosis who fulfilled our inclusion criteria. Two out of the three cases were successfully revascularized (all left sided lesions). Out of the two successful procedures, one patient had occluded SA and another had near-occlusion of the SA. It was difficult to create a channel in the third unsuccessful occluded SA due to heavily calcified plaque burden. Transfemoral access to SA was obtained using large bore guide sheaths. Ipsilateral transradial access was obtained using intermediate bore catheters. Scepter XC balloon catheter was introduced through the transradial intermediate catheter into the ipsilateral vertebral artery for distal embolic protection. No peri-operative ischemic events were identified. 6 and 18 months follow-ups showed patency of the stents with resolution of symptoms and without any adverse events.

Conclusions:

There is 1-5% risk of peri-operative stroke during SAPTA of subclavian arteries for management of SS syndrome, mostly related to distal embolization in the territory of the ipsilateral vertebral artery. We described a novel technique using balloon catheters at the vertebral ostium for prevention of distal emboli during SAPTA using a dual transfemoral and transradial approach.

Keywords: Access Catheters, Angioplasty, Subclvaian, New Technique, Cerebral Protection

Financial Disclosures: The authors had no disclosures.

First Successful Extracranial-Intracranial Bypass in Patient on Ticagrelor and Aspirin <u>Alexander Drofa, MD FRCSC¹</u>, Evgueni Kouznetsov, MD FRCSC¹

¹Sanford Health, Fargo, North Dakota, USA

Introduction:

Extracranial-intracranial (EC-IC) bypass surgery is one option to achieve revascularization in cerebrovascular stenosis. Rather than EC-IC bypass, patients are most often medically managed with dual antiplatelet therapy (DAPT) after intracranial stenting. DAPT is essential after placement of a stent to prevent thrombosis (1). Neurosurgical procedures are associated with higher risk in patients on DAPT (2). Patients are weaned off of antiplatelet therapies prior to procedures due to risk of hemorrhage; however, we report for the first time a successful emergency EC-IC bypass surgery on a patient receiving DAPT, specifically ticagrelor and aspirin.

Methods:

Our patient was a 42-year-old Caucasian female who presented with left middle cerebral artery (MCA) stroke. Computer Tomography Angiography (CTA) showed left M1 occlusion. Revascularization via uncomplicated thrombectomy with stent placement was achieved three times due to neurological deterioration hours after each attempt. Despite triple therapy with aspirin, ticagrelor, and abciximab, stent thrombosis and re-occlusion occurred for the fourth time. As additional attempts would likely be unsuccessful, EC-IC bypass was pursued. Given high risk of distal stented internal carotid artery (ICA) thrombosis with stroke, DAPT was continued without platelet transfusion. The EC-IC bypass and intraoperative hemostasis was performed and maintained using standard techniques by two neurovascular surgeons. Postoperatively, the patient improved neurologically and imaging revealed good flow. Diagnostic cerebral angiogram at 90 days after EC-IC bypass showed expected and persistent left MCA occlusion, but patent left ICA and MCA, including its stented distal segment.

Results:

To the best of our knowledge, this is the first reported successful EC-IC bypass performed with ticagrelor and aspirin after placement of an intracranial stent.

Conclusions:

Successful outcome of this patient suggests that EC-IC bypass is possible while continuing a patient on DAPT without complication and may have a humanitarian application in acute stroke management where local expertise exists when primary medical therapies failed.

Keywords: Antiplatelet, Cerebrovascular Disease

Financial Disclosures: Dr. Alexander Drofa is a paid consultant for Medtronic and MicroVention.

E-Poster 85

Mixed Dural Arteriovenous Fistula and Arteriovenous Malformation Presenting as Trigeminal Neuralgia

<u>Carlos Ynigo D Lopez, MD¹</u>, Husitha R Vanguru, MBBS¹, Rashid Ahmed, MD¹, Amr Ewida, MBBCH¹, Grahame Gould, MD¹

¹Upstate Medical University, Syracuse, New York, USA

Introduction:

Trigeminal neuralgia is a rare and painful condition. Majority of the cases are because of an aberrant loop of an artery or vein that compresses the trigeminal nerve root. Rarely are they caused by an arteriovenous malformation (AVM) or a dural arteriovenous fistula (AVF). Here we present a case of trigeminal neuralgia caused by a mixed AVM and AVF that was successfully treated with gamma knife surgery.

Methods:

A 56-year-old man presented to our institution for a 3-day-history of intractable left facial pain. The pain started about 10 months prior to admission and was described as intermittent, sharp, shock-like in the left V3 distribution, triggered by chewing or touching the face. He was on carbamazepine and lamotrigine at the time of admission. Magnetic resonance imaging (MRI) revealed abnormal vasculature at the level of the left Meckel's cave and hence patient was planned for a cerebral angiogram. Initial digital subtraction angiography (DSA) revealed a tentorial artery with a dense collection of abnormal small vessels in the region of Meckel's cave and early venous drainage to the left transverse sigmoid junction as well as the Galenic system with no clear nidus.

Results:

Embolization was planned for the suspected AVF and a high resolution computed tomography/digital subtraction angiography revealed an anterior inferior cerebellar artery-fed AVM with deep venous drainage into the galenic system and nidus in the left cerebello-pontine angle cistern. Embolization was no longer pursued due to the mixed dural AVF and pial AVM. He underwent gamma knife surgery with good symptomatic improvement. Patient reports consistent improvement on follow-up, still with occasional left facial pain but no longer interferes with function.

Conclusions:

This case illustrates a rare case of trigeminal neuralgia caused by both a dural AVF and an AVM with gamma knife surgery as a potential and effective treatment.

Keywords: Cerebral Arteriovenous Malformations, Treatment, Pathophysiology, Interventional Neuroradiology, Basic Sciences

Financial Disclosures: The authors had no disclosures.

E-Poster 86

Supratentorial and Infratentorial strokes in the setting of a Persistent Primitive Trigeminal Artery Rashid A Ahmed, MD¹, Husitha Vanguru, MBBS¹, Carlos Y Lopez, MD¹, Raja Godasi, MBBS¹, Hesham Masoud, MBBCh¹

¹State University of New York (SUNY) Upstate Medical University, Syracuse, New York, USA

Introduction:

The primitive trigeminal artery usually connects the anterior and posterior cerebral circulation in embryonic life. It is the most common fetal anastomosis between the carotid and vertebrobasilar circulations.

Methods:

We present a rare case that presented with both supratentorial and infratentorial strokes in the setting of a persistent trigeminal artery.

Results:

69 year old Caucasian male who presented with worsening residual neurological deficits. His symptoms started after lifting weights. He had worsening of his vision and confusion, in the setting of a recent left Posterior Cerebral Artery embolic stroke 3 months prior. MRI brain revealed embolic infarcts in the left MCA, PCA, and right SCA territories. CTA head and neck done revealed a persistent trigeminal artery coming off the proximal left intracranial internal carotid artery. A congenitally small basilar artery proximally with an increased luminal diameter in its distal half, as it joined the persistent left trigeminal artery was also seen. Patient also had a left ICA plaque with ulceration. This together with a persistent trigeminal artery may a conduit for a left ICA donor plaque atherothromboemboli to the posterior circulation and ipsilateral MCA.

Conclusions:

Strokes in presence of a persistent trigeminal artery have rarely been reported. They are case reports of persistent trigeminal artery being associated with bilateral occipital infarcts, brain stem infarcts, and other supratentorial areas. Here we present a unique case involving both supratentorial and infratentorial areas.

Keywords: Acute Stroke, Angiographic Ct, Atherosclerosis, Intra Caranial Stenosis

Financial Disclosures: The authors had no disclosures.

A young patient with spontaneous dissection of bilateral internal carotid and vertebral arteries. <u>Amr Ewida, Neurology resident</u>¹, Carlos Lopez, Neurology resident¹, Husitha Vanguru, Neurology Resident¹, Rashid Ahmed, Neurology resident¹, Neil Suryadevara, Neurology resident¹, Hesham Masoud, Assistant Professor¹

¹SUNY Upstate Medical University, Syracuse, New York, USA

Introduction:

Spontaneous multiple cervical vessels dissection is known to increase the risk of stroke or TIA in young and middle-aged adults. Here, we report a case of spontaneous bilateral internal carotid artery (ICA) and vertebral artery dissection without history of trauma while using a diet pill related to amphetamine.

Methods:

A 38-year-old female, of Caucasian ethnic origin with past medical history of migraine headache, had no significant family history and no consanguinity between parents who presented with persistent new onset headache, right arm numbness and tingling. She denied any history of trauma, neck manipulation with hyperextension or drug use. Review of her medications revealed current use of a diet-pill with amphetamine listed as an ingredient for weight loss.

Results:

Computed-tomography angiography (CTA) scan of the head and neck demonstrated acute dissection of the left distal cervical ICA extending into the carotid canal. Dissection of the left distal vertebral artery (V3 segment) was also identified. She was discharged on medical treatment with dual antiplatelet therapy and conservative management with planned imaging follow up. She returned to the ED two days later, with complaint of worsening headache and face and arm tingling and numbness. A repeat CTA showed the new spontaneous dissection of the right vertebral artery and right ICA with 80% focal stenosis in the petrous segment. She underwent four vessels repair with overlapping stents with reconstruction without residual stenosis.

Conclusions:

Spontaneous bilateral dissection of the internal carotid artery and vertebral artery are extremely rare. Amphetamine and it's derivatives use might be associated with spontaneous arterial dissection in genetically predisposed patients. Despite medical management with antiplatelet or anticoagulation being successful in most cases, the aggressive clinical progression of dissection with hemodynamic stenosis may necessitate early endovascular treatment.

Keywords: Endovascular Therapy

Financial Disclosures: The authors had no disclosures.

E-Poster 88

Bilateral Medial Medullary Infarction in a Patient with Basilar Artery Fenestration – Cause or Coincidence?

Raja Godasi, MBBS¹, Rashid Ahmed, MD¹, Hesham Masoud, MD¹

¹SUNY Upstate Medical University, Syracuse, New York, USA

Introduction:

Basilar artery fenestration is a congenital variant with an incidence of 5%. Medial medullary infarction is rarer, accounting for 0.5-1.5% of all strokes and bilateral involvement is uncommon.

Methods:

We report a case of bilateral medial medullary infarction in a patient with basilar artery fenestration.

Results:

A 56-year-old female with no significant cerebrovascular risk factors except for a remote history of breast cancer in remission, presented within 5 hours of sudden onset, whole body paresthesia sparing the face, oscillopsia, nausea and vomiting. Initially, neurological examination was remarkable only for bilateral vertical nystagmus. MRI brain disclosed a "V" shaped diffusion restriction in the medial medulla with ADC correlation. CTA revealed proximal basilar artery fenestration at the level of medulla. The next day, patient developed asymmetric quadriparesis, dysarthria, hypophonia and dysphagia. Repeat MRI demonstrated evolution of medial medullary infarction with FLAIR hyperintensity. An extensive stroke work was unremarkable, except for a patent foramen ovale without evidence of venous thrombosis.

Conclusions:

Pontine and lateral medullary infarctions have been reported in patients with basilar artery fenestrations. However, to our knowledge, this is the first reported case of bilateral medial medullary infarction. Partial endothelium-lined intraluminal septa appearing as spurs are seen in fenestrated arteries. These are hypothesized to cause turbulent blood flow leading to thrombosis and possible embolization from the fenestrated artery. Paradoxical embolic etiology, though a possibility in our case was thought to be unlikely in the absence of venous thrombosis or cortical infarction on DWI. Our case, as well as several others, show association between basilar artery fenestration and strokes in the brainstem. Knowledge of this rare entity is important to consider when pursing workup for medullary lacunar strokes.

Keywords: Basilar, Ischemic Stroke, Angiographic Ct

Financial Disclosures: The authors had no disclosures.

E-Poster 89

Deformation of a WEB device following deployment in an anterior communicating artery aneurysm <u>Alejandro Santillan, MD¹</u>, Alexander Ramos, MD¹, Jared Knopman, MD¹

¹New York Presbyterian Hospital/Weill Cornell Medical Center, New York, New York, USA

Introduction:

Woven EndoBridge (WEB) device has emerged as an innovative device that is delivered inside the aneurysm sac to create intra-aneurysmal thrombosis.

Methods:

We present the case of a 55 year old female with an incidentally found anterior communicating artery aneurysm that was embolized with the WEB device which underwent deformation following its deployment caused by the delivery microcatheter.

Results:

A 55 year old female with past medical history of coronary artery disease, hypertension, peripheral vascular disease, and an incidentally found anterior communicating artery aneurysm measuring 5.1 mm x 5.7 mm with a 3.9 mm neck presented for endovascular embolization. Patient received aspirin 81 mg and ticagrelor 90 mg twice a day prior to the procedure. She is neurologically intact. Patient underwent embolization of her intracranial aneurysm with a Microvention WEB 7 x 3 mm SL device. Once the device was correctly positioned in the aneurysm sac, the WEB device was detached and the pusher was removed. Upon removal of the pusher wire device, the VIA 21 microcatheter was inadvertently advanced into the WEB device causing compression and deformation of the device. There was no aneurysm rupture and the WEB device was pushed in the aneurysm dome with no return to its original shape. Patient was discharged the following day on aspirin 81 mg and will get an MRA in 3 months.

Conclusions:

Although the device was pushed through the delivery microcatheter with acceptable friction with no forward pressure of the microcatheter over the system, the microcatheter inadvertently advanced into the WEB device.

Keywords: Aneurysm Embolization, Intracerebral Aneurysm

Financial Disclosures: The authors had no disclosures.

E-Poster 90

Time Last Electrically Well : Neurophysiological Monitoring for Identification of Intra-operative Large Vessel Occlusion Formation

Jay N Dolia, MD¹, Ashutosh Jadhav, MD¹, Katherine Anetakis, MD¹, Parthasarathy Thirumala, MD¹

¹University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania, USA

Introduction:

Endovascular Thrombectomy(ET) is the only acute stroke treatment available to the perioperative large vessel occlusion stroke (LVOS) population however, there are usually delays in diagnosis which may lead to delays or exclusion from treatment and thus higher morbidity and mortality rates. We sought to describe the potential use of neurophysiological biomarkers such as intraoperative neurophysiological monitoring(IONM) with electroenecephalography (EEG) and somatosensory evoked potentials (SSEPs) in those settings and introduce the novel concept of Last Electrically Well(LEW).

Methods:

Single center retrospective study of consecutive patients undergoing surgery with concomitant IONM using EEG and SSEP. LEW was defined by one of two parameters: (i)a significant EEG change defined as a decrease in the amplitude of fast frequency by 50% or increase in theta or delta activity by 50% or (ii) significant SSEP defined as either a 50% amplitude reduction or a 10% latency prolongation of the upper extremity SSEPN20-P25 complex or the lower extremity SSEP N37-P40 complex.

Results:

Four surgical patients were identified to have a LEW resulting in action leading to prompt neuroimaging identifying stroke. Median age 62(range 51-78). Median NIHSS 25.5 (range 24-31). All surgeries performed requested SSEP and or EEG IONM. Median time from LEW to closure was 54 minutes(range 41-185). Median time from LEW to imaging: 151.5 mins (range 50-240). Two patients were transferred to the angiosuite for intervention. Case descriptions are summarized in Table 1.

Conclusions:

Our case series shows that quantifiable changes in neurophysiological biomarkers may represent a LEW time for an anesthetized patient and allowing more stroke patients to benefit from ET. Further studies are warranted.

Keywords: Acute Ischemic Stroke Intervention, Endovascular Therapy, Stroke, Treatment, Acute Stroke

Financial Disclosures: The authors had no disclosures.

E-Poster 91

Simultaneous Onset Of Subarachnoid Hemorrhage And Contralateral Ischemic Stroke Due To Infective Endocarditis

Uttam Verma, MD¹, Muhammad Niazi, MD¹, Deanna Sasaki-Adams, MD¹

¹University of North Carolina Hospital, Chapel Hill, North Carolina, USA

Introduction:

Intracranial complications are the most frequent extra cardiac complications from infective endocarditis (IE) with a mortality of over 30%. While ischemic strokes clinically manifest in 20-40% of patients, mycotic aneurysms are found in only 2-4% of patients. We aim to highlight the first case to our knowledge of simultaneous onset subarachnoid hemorrhage and contralateral ischemic stroke due to infective endocarditis.

Methods:

Case Report

Results:

32-year-old male with past medical history of IV drug abuse, presented with acute onset expressive aphasia and confusion. He had a high-grade fever, leukocytosis and grade III systolic murmur on clinical examination. CTA Head with contrast showed a 4 x 3 cm left frontal intraparenchymal hematoma and an underlying aneurysm off the distal Left MCA branch. Three hours after presentation, the patient had an acute onset right gaze deviation and left-sided weakness. Emergent CT Head showed stable left frontal IPH along with a new hyperdense right MCA and early ischemic changes in Right MCA territory. He underwent emergent IA thrombectomy with TICI 2A recanalization of Right MCA and re-demonstration of a Left M3 branch irregular aneurysm, suspicious for a possible mycotic aneurysm. Patient subsequently underwent clot evacuation and microsurgical clipping of left MCA aneurysm and rightsided decompressive hemicraniectomy for malignant ischemic infarction. TTE confirmed aortic valve vegetations and blood cultures grew Streptococcus sp. He is currently on 6-week antibiotic regimen and is recovering in NSICU.

Conclusions:

IE presents with myriad of neurological complications. Endovascular treatment (EVT) should be considered as first-line therapy for patients with known, or suspected, IE who present with LVO. EVT could also be the first line of invasive treatment in mycotic aneurysms except for technically difficult cases or in patients who need surgery for decompression of intraparenchymal hematoma. Our case is unique as it highlights the complexity of management of simultaneous ischemic and hemorrhagic event.

Keywords: Ischemic And Hemorrhagic Stroke, Endovascular Therapy, Intracerebral Aneurysm, Mechanical Thrombectomy

Financial Disclosures: The authors had no disclosures.

Flow-Diverting Stent Placement in a Pediatric Patient Through Radial Artery Approach <u>Ivo Bach, MD</u>¹, Pratit Patel, MD, Fellow¹, Neil Majmundar, MD, Resident¹, Priyank Khandelwal, MD, Attending¹

¹NJMS Rutgers, Newark, New Jersey, USA

Introduction:

While trans-radial access (TRA) has been well described in cardiac intervention it is now in its' beginnings in the realm of cerebrovascular interventions. TRA for cardiac intervention has been seldom described in the pediatric population and to our knowledge has never been described in the pediatric population for cerebrovascular intervention. Here we discuss our experience with placement of a flow diverting stent using TRA in a pediatric patient.

Methods:

A 15-year-old female was struck by a motor vehicle. CTA revealed dissection of the right internal carotid artery (ICA). Initial Diagnostic angiogram showed a nonflow limiting dissection involving mid to distal cervical segment of Right ICA, without evidence of any pseudoaneurysm. Follow-up MRA showed stenosis of the right ICA, with a new pseudoaneurysm measuring 8mm x 5mm x 6mm with a 4mm neck. Flow- diverting stent placement was chosen for treatment and TRA was considered to minimize radiation to the patient.

Results:

Right radial artery diameter was measured 2.1mm with ultrasound. Right radial artery was punctured with 2 cm 21 g needle, under ultrasound guidance. A 6 french sheath was placed in radial artery and spasmolytics were injected. A guide catheter was advanced into the distal Right common carotid artery with the help of a Sim 2 select catheter. Angiography showed around 50% narrowing of mid to distal cervical ICA with a pseudoaneurysm in the middle of the stenosed segment projecting laterally and superiorly. A microwire was navigated into the petrous portion of the internal carotid artery and a microcatheter was advanced over the microwire. An intermediate catheter was advanced into the proximal cervical segment of the Right ICA. The pipeline embolization device was deployed under real-time fluoroscopy.

Conclusions:

TRA may be safer with decreased possibility for complication when compared to femoral access and should be considered more often in pediatric patients.

Keywords: Flow Diverter, Aneurysm, New Technique, Carotid

Financial Disclosures: The authors had no disclosures.

E-Poster 93 Ocular Steal an unusual presentation of spontaneous carotid dissection Alice Ma, Dr¹

¹Boston medical Center. Previously Royal North Shore Hospital, Boston, Massachusetts, USA

Introduction:

This case is an atypical presentation of spontaneous carotid dissection and highlights the need to consider carotid vessel imaging when investigating causes of unexplained visual loss. This case also demonstrates angiographically proven ophthalmic steal as a mechanism of this patient's transient visual loss which may have protected the brain from the ischemia. This case also demonstrates the successful use of flow diversion pipeline stents as an alternative to standard carotid stents.

Methods:

N/A

Results:

N/A

Conclusions:

This case is an atypical presentation of spontaneous carotid dissection and highlights the need to consider carotid vessel imaging when investigating causes of unexplained visual loss. This case also demonstrates angiographically proven ophthalmic steal as a mechanism of this patient's transient visual loss which may have protected the brain from the ischemia. This case also demonstrates the successful use of flow diversion pipeline stents as an alternative to standard carotid stents.

Keywords: Carotid Stenting And Angioplasty

Financial Disclosures: The authors had no disclosures.

E-Poster 94

Use of IV cangrelor for cesarean section after emergent intracranial stenting for large vessel occlusion <u>Christine Hawkes, MD</u>¹, Lauren Carlos, MD², Stephanie Paolini, MD², Janet Waters, MD², Christine O'Neill, PharmD³, Francesca Facco, MD², Ashutosh Jadhav, MD²

¹McMaster University, Hamilton, Canada; ²University of Pittsburgh Medical Centre, Pittsburgh, USA; ³Dusquene University, Pittsburgh, USA

Introduction:

Intracranial stenting has been used as a "rescue" method after failed recanalization with stent-assisted mechanical thrombectomy for large vessel occlusion1,2. Dual antiplatelet therapy is a requirement to prevent thrombosis after intracranial stenting; however, it significantly increases the risk of perioperative hemorrhage. IV cangrelor, a rapidly reversible P2Y12 receptor inhibitor, has been used perioperatively to reduce the risk of hemorrhage from dual antiplatelet therapy3. This is the first description of IV cangrelor use as bridging therapy for an obstetrical patient with a recent intracranial stent.

Methods:

We report a case of a pregnant woman who underwent emergent intracranial stenting and required dual antiplatelet therapy. A protocol with IV cangrelor and aspirin was used as peri-operative bridging therapy.

Results:

A 34-year-old pregnant woman presented with acute ischemic stroke secondary to a right distal internal carotid artery occlusion. Multiple attempts with stent-assisted mechanical thrombectomy failed to achieve recanalization; so intracranial stenting was performed emergently with two balloon-mounted coronary stents. TICI 2C recanalization was achieved and she improved clinically, with a small infarct burden. She received dual antiplatelet therapy (aspirin and clopidogrel) to prevent stent thrombosis. For her delivery via cesarean section, clopidogrel was converted to IV cangrelor. After the procedure, she was transitioned back to aspirin and clopidogrel. Her cesarean section and postoperative course were uncomplicated.

Conclusions:

Cangrelor is an alternative to irreversible P2Y12 receptor inhibitors for patients on dual antiplatelet therapy requiring surgery with high bleeding risk.

Keywords: Acute Stroke, Acute Ischemic Stroke Intervention, Antiplatelet, Cerebrovascular Disease

Financial Disclosures: The authors had no disclosures.

E-Poster 95

Utilization of TCD EDS in Assessment of Antiplatelet Function in Carotid Artery Angioplasty and Stenting

Paul Lavin, MD¹, Sishir Mannava, MD¹, Amer Malik, MD¹

¹Jackson Memorial Hospital. University of Miami Neurology., Miami, USA

Introduction:

Transcranial doppler ultrasound emboli detection studies (EDS) is used in multiple clinical scenarios involving carotid artery (CA) stenosis and ischemic stroke (IS). EDS is used in both detection of real-time embolization in symptomatic and asymptomatic patients. A subset of patients receiving dual antiplatelet therapy (DAPT) have clopidogrel resistance.

Methods:

We present a 30-year-old female with severe intracranial atherosclerotic disease (ICAD) who underwent serial EDS pre and post angioplasty and stenting (A&S) which prompted further testing and confirmation of clopidogrel resistance.

Results:

A 30-year-old female with severe ICAD and prior right middle cerebral artery (MCA) IS presented with left hemiparesis and paresthesias. Emergent neuroimaging confirmed new right MCA IS on MRI brain and CT angiogram revealed right internal carotid artery (ICA) supraclinoid intracranial stenosis. Patient was compliant on aspirin (ASA) monotherapy at presentation. On hospital day (HD) #1, patient had worsening of presenting symptoms. Repeat emergent MRI brain showed no new interval ischemia. EDS of right MCA demonstrated 138 microembolic signatures (mES) over 15 minutes. The patient was loaded on clopidogrel 600mg and ASA and underwent right ICA A&S. On post-procedure day #1 (i.e. HD #2), repeat EDS showed 65 mES over 30 minutes. Persisting high mES values prompted immediate clopidogrel resistance testing which confirmed non-responder status. Patient was switched from clopidogrel to ticagrelor. Repeat EDS on HD #3 showed only 1 mES over 30 minutes. Patient remained neurologically stable and was discharged to home on ticagrelor and ASA.

Conclusions:

Our case illustrates unique applications of EDS in assessment of AP function. The routine utilization of EDS in carotid pre- and post-A&S may help to identify recurrent IS risk. Study results may also prompt immediate testing for AP resistance and identify the most optimal, patient-specific DAPT regimen. More widespread application of EDS on a national level may be necessary to improve long-term patient outcomes.

Keywords: Angioplasty, Carotid Stenting And Angioplasty, Transcranial Doppler, Intracranial Stenosis Stenting And Angioplasty, Treatment

Financial Disclosures: The authors had no disclosures.

E-Poster 1

Massive alveolar hemorrhage after the use of Tirofiban- a rare complication Nurose Karim, MD¹, James Case, MD², Mouhammad Jumaa, MD¹

¹University of Toledo Medical Center, Toledo, Ohio, USA; ²Promedica Toledo Hospital, Toledo, Ohio, USA

Introduction:

Tirofiban is known to cause diffuse microscopic alveolar hemorrhage. Here we are presenting a case of massive alveolar bleed (MAB) in a patient with subarachnoid hemorrhage (SAH).

Methods:

A 78 year-old female presented with diffuse subarachnoid hemorrhage (SAH) Hunt and Hess score 3 fissure score 4 from a 3.5 mm saccular aneurysm in the supraclinoid segment of left internal carotid artery (ICA). Patient received oral aspirin (ASA) 325 mg, Clopidogrel 600 mg, load of intravenous (IV) heparin 4000 units and a load of IV Tirofiban 10 mcg/kg. During the procedure, she became acutely hypoxic with massive pulmonary hemorrhage and refractory hypoxemia. Initial bronchoscopy had limited visibility due to massive bleeding. After resuscitation, pulmonary angiography was performed which demonstrated no active vascular hemorrhage in either the pulmonary or bronchial arteries. Follow-up cerebral angiography demonstrated patency of the ICA and the recently deployed stent with complete occlusion of the original aneurysm. Echocardiogram showed ejection fraction of 60-65%, thin circumferential pericardial effusion, no evidence of fibrin/clot or pericardial tamponade. Her Clopidogrel response test on day one was 45 (on ASA and Nimodipine) and day 2 was123 (Added Clodidogrel). We started methylprednisolone 125mg every 4 hours. The patient continued to remain unstable hemodynamically and the family withdrew the support.

Results:

-

Conclusions:

Tirofiban is known to cause diffuse alveolar hemorrhage. In our case, it caused massive pulmonary hemorrhage instead of microscopic bleed. The best explanation is that the patient was hypoxemic before the administration of Tirofiban suggesting that she was already developing some degree of neurogenic pulmonary edema (NPE) a known complication of SAH which, when combined with Tirofiban developed fulminant picture. The exact pathophysiology is still not completely understood but Tirofiban increases pulmonary capillary wedge pressure (PCWP), left ventricular systolic dysfunction, congestive heart failure and myocardial stunning.

Keywords: SAH, Aneurysm, Cerebrovascular Disease, Hemorrhage, Treatment

Financial Disclosures: The authors had no disclosures.

E-Poster 3

Transient Antiphospholipid Antibodies Associated With Acute Ischemic Stroke: A Case Report <u>Orlando A Nunez-Isaac, Dr.</u>¹, Alan Espinosa-Marron, Lic.², Alberto J Cabanas-Garcia, Dr.³

¹Independent, Merida, Mexico; ²Universidad Marista de Merida, Merida, Mexico; ³Star-Medica Group, Merida, Mexico

Introduction:

Antiphospholipid antibodies (APA) are immunoglobulins directed against phospholipids, glycoproteins and coagulation factors, inducing an in-vivo prothrombotic state which is the pathophysiologic basis of antiphospholipid syndrome. Despite the above-mentioned, APA can appear in patients without any other concomitant disease. Several studies have described this scenario, but as of today the mechanism or clinical entity that encompass the transient APA increase remains poorly understood.

Methods:

We present a case of a 47-year-old woman who arrives at the ER with a history of loss of alertness, partial clonic seizures in the right side of the body with clonic generalization and transient hemiparesis with full recovery one hour later. She has no past medical history, chronic diseases, and did not declared use of prescription or illicit drugs. Physical examination at her admittance showed a conscious woman with residual aphasia and myoclonia in the thoracic extremities. An MRI was performed which showed cortical hyperintense area of $50 \times 36 \times 33$ mm in the left parietal hemisphere which suggested an ischemic lesion. Echocardiography, CT scan, and EEG were inconclusive. Further examination showed positive titers for ANA (1:160) and IgM anticardiolipin (25 MPL). Supplementary testing for ANA and IgM anticardiolipin was performed after six weeks and resulted negative.

Results:

The patient had a satisfactory evolution, without any sequelae or new thrombotic events in the oneyear follow-up.

Conclusions:

The present case report illustrates an atypical ischemic stroke presentation in a young woman without risk factors, which also showed transient antiphospholipid antibodies increase. This phenomenon has been previously associated with ischemic strokes. Nonetheless, despite APA being described more than 30 years ago, the causation or pathophysiological mechanism of this transient event has yet to be determined.

Keywords: Acute Stroke, Coagulation, Inflammation, Thrombosis, Ischemic Stroke

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS—E-Poster ONLY: PRIMARY CATEGORY – CERVICAL STENOSIS

E-Poster 96 Imaging Outcomes In Patients With Cervicocerebral Artery Dissection JUN LEE, MD¹, Daeun Jeong, MD¹

¹Yeungnam University Medical Center, Daegu, Korea (Republic of)

Introduction:

Our aim was to identify the baseline characteristics and imaging outcomes of as well as prognostic factors which influence improving the imaging outcome for cervicocerebral artery dissection.

Methods:

We included 190 consecutive patients who were present with ischemic symptoms associated with cervicocerebral artery dissection on baseline vascular images. Imaging findings on the baseline were obtained within 7 days after symptoms onset and follow-up vascular images were performed at 3 months, 6 months, or 1 year. We compared the imaging features and the degrees of recovery (complete or partial recovery) between baseline and follow-up vascular images.

Results:

A total of 133 patients who underwent baseline and a 6-month or year vascular imaging were compared for these analyses. The median interval between baseline symptoms onset and the first vascular imaging was within a day (IQR 0, 1). The site of a dissection was more common in the posterior circulation (70.7%). The most common site of dissection was the vertebral artery (51.1%), with V4 being the most common (38.3%). Follow-up images showed partial or complete improvement of the dissected vessels in 44.4% at 3 months and 52.6% at 6 months. The lesions with stenotic/occlusion revealed better imaging recovery compared with lesions with aneurysm (51.6% vs. 3.2% at 6 months, 86.1% vs. 5.5% at the first year). After adjustment for age, gender, and eGFR, a multivariate analysis proved that dyslipidemias (OR 0.13; 95% CI 0.04-0.38, p<0.001) and lesion sites of vertebral artery (OR 0.38; 95% CI 0.16-0.89, p=0.026) were independent predictors of poor imaging outcome.

Conclusions:

The rate of complete or partial improvement was over 50% on the 6-month or year follow-up images in patients with cervicocerebral artery dissection. Dyslipidemia and vertebral artery dissection are poor prognostic factors for the recovery of the vascular lesion after cervicocerebral artery dissection.

Keywords: Carotid, Stroke

Financial Disclosures: The authors had no disclosures.

Methods of Carotid Revascularization in AIS: Safety and Efficacy in a Single Center Cohort <u>David Rosenbaum-Halevi, MD¹, Sujan Reddy, MD¹, Suhas Bajgur, MD¹, Syed K Qadri, MD¹, Liang Zhu,</u> Phd¹, Peng R Chen, MD¹, Sean I Savitz, MD¹, Sunil A Sheth, MD¹, Amrou Sarraj, MD¹

¹UTH -Health Science Center, Houston, Texas, USA

Introduction:

Carotid-stenting (CS) and balloon-angioplasty (BA) are often utilized in LVOs involving the carotid that undergo IAT. Optimal techniques are controversial in terms of indications and methodology. We examine CS vs. BA patient outcomes and procedure-related complications.

Methods:

A single center retrospective analysis of 100 patients with IAT at UTH-TMC for AIS with carotid artery occlusion from 2010-18. Clinical data was extracted per institutional IRB. Subgroups were divided by treatment. Association between outcome and intervention was analyzed (Fischer's exact test (p=0.05)).Logistic regression adjusting for age, sex, and NIHSS was performed. Primary endpoints were symptomatic hemorrhagic transformation (HT), reocclusion, mRS at 7d, and 90d. Secondary endpoints were TICI score, total length of stay(LOST), length of stay in ICU(LOSICU).

Results:

39 patients underwent CS, 5 BA, and 56 IAT alone (IATa). Groups were matched for age, sex, and comorbidities. HT occurred in 16.7% in IATa, 28.2% in CS, and 40% in BA. Reocclusion occurred in 2(40%) in BA vs 2(5.13%) in CS (P = 0.058). At day 7, 23.53% of CS case were mRS of 0-2 vs 0% in BA (P=0.069). 90d mRS of 0-2: 49.4% in CS vs. 33.3 % in both BA and IATa (P=0.0115). Death at 7d: 0 in BA, 3 in CS, and 12 in IATa. Death at 90 days: 0% in BA, 3.2 % in CS, and 25 % in IATa (P=0.036). TICI 2b/3 was achieved in 100% BA, 85.71% in IATa, and 84.62% in CS. LOST and LOICU were similar in all groups.

Conclusions:

While sample sizes are small, our experience suggests CS is superior to BA in maintaining vessel patency, minimizing HT, and improving functional outcomes. Both methods are superior to IATa in improving functional outcomes. There is an increased risk of HT with both BA and CS. Larger trials are needed to create safe and effective protocols.

Keywords: Acute Ischemic Stroke Intervention, Carotid Stenting And Angioplasty, Balloon Angioplasty, Revascularization, Stenting

Financial Disclosures: The authors had no disclosures.

Safety and Efficacy of Acute Emergent Carotid Stenting Treatment for Symptomatic Carotid Stenosis <u>Sudeepta Dandapat, MD</u>¹, Darko E Quispe, MD¹, Santiago Ortega Gutierrez, MD, MSc¹, Edgar Samaniego, MD¹, Cynthia Zevallos, MD¹, Andrea Holcombe, PhD¹, Aldo Mendez, MD¹, Andres Dajles, MS¹, Khaled Asi, MD¹, Kaustubh Limaye, MD¹, Sameer Ansari, CNA¹, Saad Ansari, MS¹, Sudeepta Dandapat, MD¹

¹UNIVERSITY OF IOWA, IOWA CITY, Iowa, USA

Introduction:

Carotid endarterectomy and carotid stenting (CAS) have shown comparable outcomes in symptomatic patients. CAS optimal timing is controversial. We aim to evaluate the safety and efficacy of CAS when performed emergently during hospitalization of symptoms onset vs. an elective procedure in a subsequent admission.

Methods:

We performed a retrospective analysis of CAS patients admitted to our comprehensive stroke center with TIA/stroke and ipsilateral extracranial carotid stenosis>50% from January 2015 to September 2019. Medical records were reviewed for demographics, clinical data and outcomes. The primary outcome was defined as any stroke, myocardial infarction or death related to the procedure at 3 months of follow-up. Secondary outcomes were minor neurological and non-neurological complications, and rate of restenosis or occlusion at follow-up defined as a Peak Systolic Velocity by duplex ultrasonography greater than 300cm/s or stenosis greater than 70% by angiography when available. Logistic regression and time-to-event analyses were used to compare outcomes and restenosis at follow-up.

Results:

We identified 75 emergency and 104 elective patients. Emergent patients differed significantly in the rates of dyslipidemia (44% vs.66%, p=0.003), length of hospitalization (4.9% vs.1.2%, p=0.002), ipsilateral carotid occlusion (17% vs.2%, p<0.001), general anesthesia (19%vs.4%, p=0.001) and treatment with Tirofiban during procedure (13% vs. 4%, p=0.008). There was no significant difference in primary outcome rates (9.3%vs3.8%, p=0.21). After individually adjusting for general anesthesia (p=0.12), ipsilateral occlusion (p=0.13) and Tirofiban treatment (p=0.14), there was no significant increase in risk. No significant differences in minor neurological complications (5% vs.1%, p=0.16) or minor non-neurological complications (12%vs.11%, p=0.76) rates were found. There was no difference in the rate of restenosis (7% and 13.3%) with a mean of follow-up of 12.8 months.

Conclusions:

CAS in symptomatic emergency patients have comparable safety to elective patients at 3 months of follow-up. Long-term follow-up found similar rates of restenosis up to 12.8 months.

Keywords: Stenting, Endovascular Therapy, Ischemic Stroke, Stenting, TIA

Financial Disclosures: The authors had no disclosures.

Safety and Efficacy of Acute Carotid Stenting Treatment in Acute Symptomatic Patients

<u>Santiago Ortega Gutiérrez, MD, MSc</u>¹, Darko E Quispe, MD¹, Kaustubh Limaye, MD¹, Cynthia Zevallos, MD¹, Andrea Holcombe, PhD¹, Aldo Mendez, MD¹, Andres Dajles, MS¹, Sameer Ansari, CNA¹, Saad Ansari, MS¹, Edgar Samaniego, MD¹, Sudeepta Dandapat, MD¹, Santiago Ortega Gutiérrez, MD, MSc¹

¹University of Iowa, Iowa city, Iowa, USA

Introduction:

Carotid stenting (CAS) has been shown to be equivalent to carotid endarterectomy in symptomatic patients. CAS optimal timing remains controversial. We aim to evaluate the safety and efficacy of CAS when performed in the hyperacute period.

Methods:

We retrospectively reviewed CAS patients from our comprehensive stroke center with TIA/stroke and ipsilateral extracranial carotid stenosis >50% from January 2015 to September 2019. Hyperacute and acute treatment were defined as CAS within 48 hours and 48 hours to 14 days from symptoms onset, respectively. The primary outcome was defined as any stroke, myocardial infarction or death related to the procedure at 3 months of follow-up. Secondary outcomes were minor neurological and non-neurological complications, and rate of restenosis at follow-up defined as a Peak Systolic Velocity by duplex ultrasonography higher than 300cm/s or stenosis greater than 70% by angiography. Logistic regression and time-to-event analyses were used to compare outcomes and restenosis rates at follow-up.

Results:

We identified 39 patients with hyperacute treatment and 58 with acute treatment. The hyperacute treatment group differed significantly in thrombectomies (36%vs.3%, p<0.01), ipsilateral carotid occlusion (28%vs.3%, p<0.001) and treatment with Tirofiban treatment (25.6%vs.1.7, p<0.001). There were no differences in primary outcome (7.6%vs.6.9%, p=1) or minor neurological complication (8%vs.2%, p=0.29) rates between groups. Hyperacute treatment was not associated with greater risk after adjusting for Tirofiban treatment (p=0.14), ipsilateral occlusion (p=0.08) and general anesthesia (p=0.13). Differences were found in minor non-neurological complication rates (21%vs.3%, p=0.0133). Hyperacute treatment was associated with greater risk of non-neurological complications after adjusting individually for thrombectomy (OR:5.7, CI:1.02-31.8) and Tirofiban treatment (OR:6.02, CI:1.1-32). There was no difference in restenosis rates (8.1% and 9.1%) with a median of follow-up of 9.8 months.

Conclusions:

CAS appears to be a safe option to treat symptomatic carotid in the hyperacute period. Restenosis rates were similar after CAS in hyperacute and acute treatment.

Keywords: Carotid Stenting And Angioplasty, Endovascular Therapy, Ischemic Stroke, TIA, Extracranial Stenosis

Financial Disclosures: Consultant for Microvention Consultant for Stryker neurovascular

CLINICAL ABSTRACTS—E-Poster ONLY: PRIMARY CATEGORY – EMERGING THERAPIES

E-Poster 100

Transcirculation Approach in Endovascular Neurosurgery: A Multicenter Study

<u>Edgar A Samaniego, MD</u>¹, Jorge A Roa, MD¹, Pascal M Jabour, MD², Mario Martinez-Galdamez, MD³, Santiago Ortega-Gutierrez, MD, MSc¹, Alberto Maud, MD⁴, Guilherme Dabus, MD⁵, Miguel Schüller Arteaga, MD³, Jorge Galvan Fernandez, MD³, Diego Paez-Granda, MD⁶, Vladimir Kalousek, MD⁷, Roger Barranco Pons, MD⁸, Ashkan Mowla, MD⁹, Gary Duckwiler, MD⁹, Viktor Szeder, MD⁹, David M Hasan, MD¹, Edgar A Samaniego, MD, MS¹

¹University of Iowa Hospitals and Clinics, Iowa City, Iowa, USA; ²Thomas Jefferson University Hospitals, Philadephia, Pennsylvania, USA; ³Hospital Clinico Universitario, Valladolid, Spain; ⁴Texas Tech University Health Sciences Center El Paso, El Paso, Texas, USA; ⁵Miami Cardiac and Vascular Institute, Miami, Florida, USA; ⁶Virgen de la Arrixaca University Hospital, Murcia, Spain; ⁷University Clinical Hospital Center "Sestre Milosrdnice", Zagreb, Croatia; ⁸L'Hospitalet de Llobregat, Barcelona, Spain; ⁹University of California Los Angeles, Los Angeles, California, USA

Introduction:

Unfavorable anatomy can preclude traditional anterograde endovascular interventions. Transcirculation approaches provide alternative pathways for successful treatment of these cases. We report the largest experience of transcirculation approaches in complex endovascular neurosurgical cases.

Methods:

Nine centers provided retro-spective data on patients who underwent transcirculation procedures, including embolization of intracranial aneurysms (IAs), arteriovenous fistulas (AVFs), arteriovenous malformations (AVMs), and thrombectomy of acute ischemic strokes (AIS).

Results:

Fifty-two patients were treated using transcirculation approaches: 33 IAs, 3 AVMs, 3 AVFs and 13 AIS. Mean age was 58.2 ± 14.8 years, and 28 (53.8%) were women. Most IAs (22/33, 66.7%) were treated electively. Three AVMs and 2 AVFs presented ruptured. Most common indication for transcirculation approach was occlusion of the parent artery (40.4%). The posterior communicating artery was crossed in 21 cases, anterior communicating artery in 21 cases, and vertebral artery in 4 cases. In 6 patients, double transcirculation access was used. Raymond-Roy Occlusion Classification grades (RROC) I–II was achieved in 97% (32/33) of IAs. All AVMs and AVFs were embolized completely. TICI 2b-3 recanalization was achieved in 69.2% (9/13) of AIS patients. Three procedural complications were reported: two arterial clots/thrombi and one retroperitoneal hematoma. Good functional outcome (modified Rankin Scale score 0-2) was achieved in 38/52 subjects (73.1%). Four patients died after intervention, but only one death (1.9%) was procedure-related. Of 24 IAs with radiographic follow-up, RROC I–II was observed in 95.8% (23 cases).

Conclusions:

Endovascular transcirculation approaches may be used in complex angioarchitectures. Newer endovascular devices have improved neurological and angiographic outcomes in these cases.

Keywords: Treatment, Aneurysm Embolization, Mechanical Thrombectomy, Neurointerventional Training, New Technique

Financial Disclosures: The authors had no disclosures.

NBCA Embolization of the Middle Meningeal Artery for Chronic Subdural Hematomas: Consecutive Case Series

<u>Rishi Gupta, MD, MBA</u>¹, Anna Bouchard, AG-ACNP¹, Phillip V Parry, MD¹, Marcus Gates, MD¹, Edward Hsu, MD¹

¹Wellstar Neurosurgery, Marietta, Georgia, USA

Introduction:

Subdural hematomas (SDH) are increasing in frequency with an aging population being placed on blood thinners. Surgical treatments of chronic SDH (cSDH) have recurrence rates between 10-30% particularly in patients on blood thinners. Middle meningeal artery (MMA) embolization may be an adjunctive treatment option for decreasing the frequency of cSDH recurrences and in some cases an alternative primary treatment option for poor surgical candidates with cSDH.

Methods:

We developed a protocol at our institution to perform MMA embolization in patients with cSDH more than 10 mm in maximal diameter without focal neurological deficits as a standalone therapy or as an adjunct to surgery to prevent recurrence. IRB approval was obtained for this study.

Results:

A total of 16 patients underwent 20 MMA (4 patients bilateral) embolizations with n-Butyl cyanoacrylate (NBCA) between 4/22/19-8/30/19. The mean age for this cohort was 67±15 years. The mean diameter of the SDH was 14.8±5.9 mm with a midline shift of 3.7±3.8 mm. A total of three patients were on antiplatelets, three patients on anti-coagulation and three patients had coagulopathy due to liver failure. Standalone treatment was performed on nine patients and adjunctive treatment to surgery in seven patients. The median time to follow up is 43 days with no patient requiring an open surgical procedure for recurrence or expansion of the SDH. One patient developed a facial palsy that partially recovered after the embolization.

Conclusions:

NBCA embolization of MMA appears to be a safe adjunctive procedure for decreasing recurrence rates of cSDH in short term follow up. Additionally, MMA embolization may be a safe and effective primary alternative treatment option to surgery for appropriately selected patients who are poor surgical candidates. Further study is required to assess the efficacy of this treatment protocol particularly with a longer term follow up.

Keywords: Embolization, NBCA, SDH, Endovascular Therapy, Clinical Investigations

Financial Disclosures: The authors had no disclosures.

Silk Vista Baby (SVB) flow diverting stent for the treatment of distal complex intracranial aneurysms <u>Christine Hawkes, MD¹</u>, Aviraj Deshmukh, MD¹, Amanda Martynuik, BSc, MSc¹, Almunder Algird, MD¹, Bill Wang, MD, MSc¹, Brian van Adel, MD, PhD¹

¹McMaster University, Hamilton, Canada

Introduction:

Endovascular treatment of complex/wide-neck intracranial aneurysms has proven difficult with standard coil embolization. Balloon remodeling or stent-assisted coiling have been introduced to improve the likelihood of successful coil embolization of intracranial aneurysms with complex angioarchitecture. Flow diverting stents have proven promising for aneurysms arising from the distal intracranial circulation, however, the requirement of larger and stiffer microcatheters for deployment has limited their use. Stent and catheter technology is rapidly evolving, and one of the newest flow-diverting stents available is the Silk Vista Baby (SVB, Balt) that can be delivered via a small 0.017" microcatheter. The purpose of this study was to evaluate the efficacy and safety of deployment of the SVB stent in the treatment of complex/wide-neck intracranial saccular aneurysms.

Methods:

A retrospective analysis was conducted on patients treated at Hamilton Health Sciences, McMaster University from September 2018 to September 2019 using the SVB flow diverting stent for endovascular treatment of ruptured and unruptured intracranial aneurysms. All clinical and radiological data were analyzed with follow-up of 0-12 months.

Results:

There were 12 patients treated with 13 SVB flow diverting stents. All patients were pre-treated with dual antiplatelet therapy. The majority of aneurysms treated were unruptured aneurysms within the anterior cerebral circulation. In all cases, the SVB stent was successfully deployed in small caliber parent vessels (1.1-2.5 mm) via a small 0.017" microcatheter. There were no intraprocedural thromboembolic events and only one case of delayed in-stent thrombosis (in a patient who was non-compliant with antiplatelet therapy). There was one case with delayed re-rupture of a treated dissecting pseudoaneurysm. Occlusion rates for treated aneurysms were complete/near complete in the vast majority of the cases (> 90%).

Conclusions:

Endovascular treatment of complex/wide-necked intracranial aneurysms with the SVB flow diverting stent is both safe and effective.

Keywords: Aneurysm, Flow Diverter, New Technique, Intracerebral Aneurysm, Invention

Financial Disclosures: The authors had no disclosures.
Safety of Low-dose Intravenous Cangrelor for Acute Stenting During Neurointerventional Treatment: A single-center Case Series

<u>Hisham Salahuddin, MD¹</u>, Alicia Castonguay, PhD¹, Nashra Bukhari, MD¹, Ehad Afreen, MD¹, Richard Burgess, MD¹, Syed F Zaidi, MD¹, Mouhammed Jumaa, MD¹

¹University of Toledo, Toledo, Ohio, USA

Introduction:

Management of ischemic stroke and hemorrhagic disease with endovascular means often requires placement of intracranial stents in the acute setting; however, standardized protocols for platelet inhibition are lacking. Cangrelor is a potent intravenous P2Y12 receptor antagonist with a rapid onset and short half-life of 3-6 minutes. Here, we report six cases of short-term use of intravenous cangrelor in patients undergoing neurointerventional procedures at our center.

Methods:

We retrospectively collected baseline, procedural, angiographic, and clinical outcome data on patients undergoing acute stenting during neurointerventional treatment who received low-dose cangrelor from January to August 2019.

Results:

Six cases where identified; median age was 67 (64 – 80). Three patients received internal carotid artery stents, two for critical ICA stenosis discovered during tandem mechanical thrombectomy, and one for an iatrogenic ICA dissection in a patient with subarachnoid hemorrhage undergoing post-surgical clipping angiography. Another patient had a basilar stent placed during mechanical thrombectomy for a critically stenosed, re-collapsing basilar artery. Our fifth patient required an intracranial stent in the setting of coil herniation during treatment for a ruptured posterior communicating artery aneurysm. In our sixth patient, an elective pipeline embolization device was being placed for an ICA cavernous segment aneurysm, when mid-segment thrombosis was noted intraprocedurally, requiring a low dose cangrelor drip. Cangrelor was started with a 15 mcg/kg bolus at the time of stent placement followed by an infusion of 2 mcg/kg/minute. Cangrelor infusion would be discontinued within 12 hours, followed by immediate administration of dual antiplatelets. None of the patients experienced thromboembolic complications or worsening of intracranial hemorrhage.

Conclusions:

In this small series, we report six cases of low-dose cangrelor being used as a safe and effective shortterm option for emergent antiplatelet effect in patients undergoing acute intracranial stenting. Further studies are warranted.

Keywords: Stenting, Antiplatelet, Ischemic And Hemorrhagic Stroke, New Innovation, SAH **Financial Disclosures:** The authors had no disclosures.

CLINICAL ABSTRACTS—E-Poster ONLY: PRIMARY CATEGORY – IMAGING

E-Poster 104

Efficient Multimodal MRI Evaluation for Endovascular Thrombectomy of Anterior Circulation Large Vessel Occlusion

<u>Kunakorn Atchaneeyasakul, MD</u>¹, David Liebeskind, MD¹, Reza Jahan, MD¹, Sidney Starkman, MD¹, Latisha Sharma, MD¹, Bryan Yoo, MD¹, Johanna Avelar, BS¹, Neal Rao, MD¹, Jason Hinman, MD, PhD¹, Gary Duckwiler, MD¹, May Nour, MD, PhD¹, Victor Szeder, MD, PhD¹, Satoshi Tateshima, MD, PhD¹, Geoffrey Colby, MD, PhD¹, Mersedeh Bahr, MD¹, Radoslav Raychev, MD¹, Doojin Kim, MD¹, Jeffrey Saver, MD¹

¹University of California Los Angeles, Los Angeles, California, USA

Introduction:

MRI and CT modalities are both current standard-of-care options for initial imaging in patients with acute ischemic stroke due to large vessel occlusion (AIS-LVO). MR provides greater lesion conspicuity and spatial resolution, but few series have demonstrated multimodal MR may be performed efficiently.

Methods:

In a prospective Comprehensive Stroke Center Registry, we analyzed all anterior circulation LVO thrombectomy patients between 2012-2017 who: 1) arrived directly by EMS from the field, and 2) had initial NIHSS \geq 6. Center imaging policy was multimodal MRI (including DWI/GRE/MRA w/wo PWI) as the initial evaluation in all patients without contraindications, and multimodal CT (including CT with CTA, w/wo CTP) in the remainder.

Results:

Among 106 EMS-arriving endovascular thrombectomy patients, initial imaging was MRI 62.3%, CT in 37.7%. MRI and CT patients were similar in age (72.5 vs 71.3), severity (NIHSS 16.4 v 18.2), and medical history, though MRI patients had longer onset-to-door times. Overall, door-to-needle (DTN) and door-to-puncture (DTP) times did not differ among MR and CT patients, and were faster for both modalities in 2015-2017 versus 2012-2014. In the 2015-2017 period, for MR-imaged patients, the median DTN 42m (IQR 34-55) surpassed standard (60m) and advanced (45m) national targets and the median DTP 86m (IQR 71-106) surpassed the standard national target (90m).

Conclusions:

AIS-LVO patients can be evaluated by multimodal MR imaging with care speeds faster than national recommendations for door-to-needle and door-to-puncture times. With its more sensitive lesion identification and spatial resolution, MRI remains a highly viable primary imaging strategy in acute ischemic stroke patients, though further workflow efficiency improvements are desirable.

Keywords: Stroke

Financial Disclosures: The authors had no disclosures.

E-Poster 105

Cost Effectiveness of Trans-Radial Approach For Cerebral Angiography

<u>Pratit Patel, MD¹</u>, Madheea Siddiqi, MD¹, Russell Johnston, BS², Amit Singla, MD¹, Priyank Khandelwal, MD¹

¹Rutgers University, Newark, New Jersey, USA; ²Hackensack Meridian School of Medicine at Seton Hall, Nutley, New Jersey, USA

Introduction:

This study aims to perform a cost effectiveness analysis of the transradial approach (TRA) in comparison to the transfemoral approach (TFA) in the setting of elective diagnostic cerebral angiograms.

Methods:

A retrospective review of a prospectively maintained data base of all elective diagnostic cerebral angiograms from September 2018 to July 2019 was performed. 88 procedures were categorized into TRA (n=48, 17 males, 31 females; age range 17-81 years) and TFA (n=40, 5 male, 35 female; age range: 22-77) to determine the mean, median and range values of in-hospital length of stay (LOS), post-procedure length of stay (PP LOS), and PACU time. Procedural material and nursing costs were calculated to determine cost-effectiveness. TRA vs. TFA were compared using the student's T-test.

Results:

The average LOS was 4.9 vs. 8.7 hours for TRA vs. TFA (Median: 4.5 vs 7.9 hours; Range: 2.41-9.5 hours vs 3.33-29.25 hours). The t-value was 5.35952 (p-value <.00001). The average PP LOS was 3.3 vs. 7 hours for TRA vs. TFA (Median: 3 vs 6.3 hours; Range: 1.5-8.16 vs. 2.4-27.25). The t-value was 5.49882 (p-value <.00001). The average PACU time was 2.29 vs. 4.0 hours for TRA vs. TFA (Median: 2 and 4; Range: 1.05-7.16 vs. 3.84-6). The t-value was 10.14156 (p-value <.00001). Total material costs including, sheath, catheters and closing devices were \$361.07 and \$569.32 for TRA and TFA respectively. As per hospital data, Nursing costs were estimated to be \$80/hour. Therefore, average PACU nursing cost was \$183.20 and \$320 for TRA and TFA respectively. In total, TRA and TFA cost were estimated to be around 544.27 and 889.32 respectively. There were no post-procedural complications in either group.

Conclusions:

In this study, transradial access significantly decreased in hospital length of stay, post-procedural length of stay and PACU time. Additionally, obtaining transradial access resulted in a cost savings of \$345.05/procedure.

Keywords: Angiogram

Financial Disclosures: The authors had no disclosures.

Association Of Pre-Mechanical Thrombectomy Collateral Scores with Infarct Volumes on Computed-Tomography-Head Scan

Taha Nisar, MBBS¹, Osama Abu-hadid, MD², Priyank Khandelwal, MBBS²

¹Montefiore Medical Center, The Bronx, New York, USA; ²Rutgers New Jersey Medical School, Newark, New Jersey, USA

Introduction:

Collateral circulation refers to the supplementary vascular supply, which can potentially reduce the infarct volume in the event the main vascular supply gets compromised. Our study aims to determine if pre-MT collateral scores are associated with smaller infarct volumes after mechanical-thrombectomy (MT).

Methods:

We performed a retrospective chart review of adult patients who underwent MT for an anteriorcirculation large-vessel-occlusion at a comprehensive stroke center from July 2014 to March 2018. We used Miteff, Maas, and modified-Tan collateral grading methods to grade collaterals on the prethrombectomy single-phase computed-tomography-angiography (CTA). Mass scale was used as a dichotomous categorical scale with a score of 1-2 for poor collaterals and 3-5 for good collaterals. Miteff scale was used as a dichotomous categorical scale with score of 1 for poor collaterals and 2-3 for good collaterals. Modified-Tan scale was used as a dichotomous categorical scale depending on whether collaterals filled >50% of the territory distal to the occluded middle-cerebral-artery. A logistic regression analysis was performed, controlling for age, pre-MT NIHSS-scores, thrombolysis-in-cerebral-infarction (TICI)-scores, duration to thrombectomy with pre-thrombectomy collateral scores as the predictors. The primary outcome was the size of the infarct on Computed-Tomography-Head Scan (CTH). The volume of the infarct was calculated using the ABC/2 method.

Results:

63 patients met study inclusion criteria. 34 (53.97%) patients were male. The mean age of our cohort was 65.03±14.12 years. In the logistic regression model, The pre-MT scores using the collateral grading systems of Maas (OR, 0.997; 95% CI, 0.994-1; P 0.045) was significantly associated with the infarct volume on CTH, while the scales of Miteff (OR, 0.998; 95% CI, 0.995-1; P 0.109) and Modified-Tan (OR, 0.998; 95% CI, 0.996-1.001; P 0.203) were not.

Conclusions:

Our study showed a significant association between a better pre-MT collateral score of Mass with a smaller infarct volume on CTH post-MT.

Keywords: Angiographic Ct, Imaging, Acute Ischemic Stroke Intervention

Financial Disclosures: The authors had no disclosures.

Quantitative Comparison of Multidetector CT and Cone-Beam CT Perfusion in Stroke Patients Undergoing Mechanical Thrombectomy.

<u>Santiago Ortega Gutiérrez, MD, MSc¹</u>, Santiago Ortega Gutiérrez, MD, MSc¹, Darko Quispe, MD¹, Sebastian Sebastian Schafer, PhD², Beverly Aagaard-Kienitz, MD³, Charles Strother, MD³, Chen Guang-Hong, PhD³, John Garrett, PhD³, Andrea Holcombe, PhD¹, Gloria V Lopez, MD¹, Cynthia Zevallos, MD¹, Edgar Samaniego, MD¹, Sudeepta Dandapat, MD¹, Khaled Asi, MD¹, Colin Derdeyn, MD¹

¹University of Iowa, Iowa city, Iowa, USA; ²Siemens Medical Solutions, Hoffman Estates, Illinois, USA; ³University of Wisconsin-Madison, Madison, Wisconsin, USA

Introduction:

CT or MR cerebral perfusion is the gold standard modality to select large vessel occlusion (LVO) stroke patients presenting >6 hours from symptom onset. Cone beam C-arm CT perfusion (CBCTP) in angiography suites could reduce time to endovascular revascularization. We aimed to evaluate the reliability of using CBCTP when compared to multidetector CT perfusion (MDCTP).

Methods:

In this prospective, single-arm, interventional study, 14 LVO anterior circulation thrombectomy patients underwent both MDCTP and CBCTP <30 minutes apart prior to revascularization. Image data was reconstructed into CBF, CBV, MTT and TTP maps. Three types of measurements were used to compare modalities. In measurement 1, six circular regions of interest (ROI) (400mm2) were placed in the anterior arterial territory. In measurement 2, circular ROIs were placed in the ASPECTS regions (cortical 300mm2, subcortical 200mm2). In measurement 3, a ROI was drawn around the entire affected area. All ROIs were placed in the basal ganglia and supraganglionic level of both brain sides. Rates (unaffected/affected area) between MDCTP and CBCTP were compared for all sequences. The intraclass correlation coefficient (ICC) was calculated using a single rater, consistency, two-way random-effects model.

Results:

Measurement 1 found a moderate degree of agreement between MDCTP and CBCTP in CBF, CBV, MTT and TTP rates with ICCs of 0.58 (CI: 0.42-0.69), 0.65 (CI: 0.53-0.74), 0.77 (CI: 0.68-0.83) and 0.52 (CI: 0.35-0.65). In measurement 2, moderate agreement was found in CBF, CBV and MTT rates; with ICCs of 0.51 (CI: 0.32-0.65), 0.57 (CI: 0.4-0.69) and 0.62 (CI: 0.47-0.73). The results of measurement 3 found an excellent (ICC: 0.95, CI: 0.88-0.98), good (ICC: 0.83, CI 0.62–0.9) and moderate (ICC: 0.7, CI: 0.34-0.87), degree of agreement in the CBV, MTT and CBF rates, respectively.

Conclusions:

These results demonstrate promising accuracy of CBCTP in evaluating ischemic tissue in patient presenting with LVO acute stroke.

Keywords: Ischemic Stroke, Ct Perfusion, Imaging, Angiographic Ct, Penumbra

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS—E-Poster ONLY: PRIMARY CATEGORY – INTERESTING CASES

E-Poster 108

Outcomes of Carotid Blowout Syndrome at a Comprehensive Stroke Center

<u>Alexander J Sweidan, MD¹</u>, Andrew Schnure, DO¹, Ichiro Yuki, MD, PhD¹, Roy M Fujitani, MD¹, William B Armstrong, MD¹, Shuichi Suzuki, MD, PhD¹

¹University of California, Irvine, Orange, California, USA

Introduction:

Carotid blowout syndrome (CBS) is a rare but dreaded complication of head and neck cancer with high mortality. Management of CBS requires a multidisciplinary approach; nevertheless, endovascular therapy (EVT) remains the cornerstone in rendering hemostasis. Literature routinely describes successful hemostasis with either deconstructive (artery take down) or reconstructive (stenting or bypass) approach. Previous retrospective analysis suggests that outcomes are predicted by clinical severity at presentation, not treatment type. We suggest that outcomes and durability of treated CBS are best at Comprehensive Stroke Centers (CSC).

Methods:

Single-center, retrospective case review of EVT of CBS and outcome at a CSC.

Results:

Five cases of CBS were identified between 2012 to 2019. All patients suffered head and neck cancer treated with radiation. In the five patients, three achieved hemostasis with reconstruction, while two was treated with deconstruction. All five patients achieved hemostasis and were discharged from the hospital without any further complications related to the procedure. No perioperative mortality, stroke and infection was identified. Endovascular approaches permit evaluation of collateral circulation in situations where target artery warrants take down. Therefore, concurrent cerebral angiogram with EVT by way of stenting or sacrificing the target artery with embolic materials has become the alternative in otherwise inoperable condition as an emergent standard of care. Furthermore, at a CSC where EVT is frequently done, other specialties can concomitantly offer treatment and improve patient outcomes.

Conclusions:

In our retrospective study we demonstrate continued EVT as a means of treatment for CBS to achieve emergent hemostasis. However, we purport that outcomes are best at a CSC.

Keywords: Carotid Stenting And Angioplasty, Head And Neck Malformation Therapy, Stenting, Coagulation, Embolization

Financial Disclosures: The authors had no disclosures.

E-Poster 109

The Retrograde Approach to Transverse-Sigmoid Sinus Stenting

Weston R Gordon, M.D.¹, Michael G Abraham, M.D.¹

¹The University of Kansas Health System, Kansas City, Kansas, USA

Introduction:

Endovascular dural sinus stenting has emerged as a safe and effective therapy for idiopathic intracranial hypertension (IIH) in patients with transverse-sinus stenosis associated with a significant mean pressure gradient (MPG). The typical antegrade approach, jugular to sigmoid to transverse, is not always technically feasible due to tortuosity of the dural sinuses or degree of stenosis. To this point, there has been no reported cases of retrograde dural sinus stenting. We describe three cases of dural sinus stenting from a contralateral transverse-sigmoid sinus approach.

Methods:

A retrospective chart review was performed on all IIH patients who underwent dural sinus stenting.

Results:

Three female patients were identified and were treated under general endotracheal anesthesia. Stenoses measured 78%, 72% and 67% with MPGs across the transverse-sigmoid sinus of 16, 19 and 9 mmHg, respectively. In each case, high-grade stenosis resulted in multiple failed attempts to advance the stent microcatheter despite using a variety of microwires. A microwire was then advanced across the torcula from the contralateral dural sinus system with deployment of the stent in a retrograde manner. Balloon angioplasty was performed from the contralateral side with resolution of residual stenosis and post-stenting MPGs of 0, 1 and 1 mmHg, respectively. Each patient was discharged on dual anti-platelet therapy without complication and with resolution of symptoms on follow up.

Conclusions:

This case series demonstrates successful transverse-sigmoid sinus stenting from a contralateral dural sinus approach in patients with IIH. These findings provide an alternate approach to dural sinus stenting in patients with IIH.

Keywords: Stenting, Balloon Angioplasty, New Technique, Endovascular Therapy

Financial Disclosures: The authors had no disclosures.

Intraprocedural Hypertension and Blood Pressure Variability are Associated with Contrast Induced Neurotoxicity after Neurointerventional Procedures

<u>Cynthia B Zevallos, MD</u>¹, Biyue Dai, Ms¹, Andrea L Holcombe, PhD¹, Sameer Ansari, CNA¹, Darko Quispe, MD¹, Aldo Mendez, MD¹, Edgar Samaniego, MD, MS¹, Sudeepta Dandapat, MD¹, Santiago Ortega-Gutierrez, MD, MSc¹

¹University of Iowa, Iowa City, Iowa, USA

Introduction:

Contrast induced neurotoxicity (CIN) is a rare complication of neurointerventional procedures and its understanding remains limited. We aim to evaluate its association with hemodynamic variables.

Methods:

A retrospective case-control study from a prospectively collected database of 2510 adult neurointerventional patients, treated at a single center from 2014 to 2018, was done. Cases were randomly matched to controls by age, diagnosis and type of procedure (1:2 ratio). CIN was defined as onset of new neurological deficits ≤24 hours after a procedure and complete work-up excluding other causes. Demographic, clinical and imaging data were obtained from medical records. Hemodynamic parameters, including invasive and noninvasive intraprocedural systolic blood pressure (SBP), diastolic blood pressure (DBP) and mean arterial pressure (MAP), were obtained from anesthesia reports. Baseline blood pressure (BP) was defined as the first outpatient visit measurement. The area between baseline and intraprocedural BP was used to define sustained increases/decreases of BP over time as a measure of variability. A generalized linear mixed model was used to estimate the BP difference between groups over time.

Results:

The cases had median age of 76 (IQR 65-81) vs. 66 (IQR 56-75) in the controls. Diagnoses were unruptured aneurysm (82%) and carotid stenosis (18%). Cases had higher measurements and greater variability for: SBP [median 125 (IQR: 121-147) vs. 114 (IQR: 107-124) mmHg], median area above baseline [median 350 (IQR: 25-1328) vs. 52 (IQR: 0-293) mmHg] and MAP [median 85 (IQR: 79-98) vs. 80 (IQR: 74-89) mmHg]. Cases demonstrated a significant mean increase in SBP and MAP of 23.41 mmHg (p< 0.01) and 13.79 mmHg (p< 0.01), respectively, over time.

Conclusions:

Uncontrolled procedural high SBP and BP variability might contribute to the pathophysiology of CIN. Acute hypertension may increase blood brain barrier permeability and allow contrast to leak into the brain parenchyma causing direct toxicity that can cause CIN symptoms.

Keywords: Pathophysiology, Cerebral Blood Flow, Clinical Investigations, Endovascular Therapy, Interventional Neuroradiology

Financial Disclosures: The authors had no disclosures.

Recanalization of Ophthalmic Artery Occlusion Following Flow Diversion: Case Report and Literature Review

Lila Sheikhi, MD¹, Gabor Toth, MD¹

¹Cleveland Clinic, Cleveland, Ohio, USA

Introduction:

Flow diverter devices have had an increasing role in treating intracranial aneurysms over the last decade. The most commonly reported ophthalmic complications include amaurosis fugax and retinal emboli, which can be immediate or delayed. Neointimal formation or delayed thrombosis are hypothesized as possible mechanisms. Here we report a case of delayed ophthalmic artery occlusion and recanalization in the setting of flow diverter embolization of an ophthalmic segment aneurysm.

Methods:

We review a patient's clinical course and imaging characteristics following flow diverter treatment. An additional literature review is provided.

Results:

A 46 year old woman with a history of migraines and epilepsy presented with an incidental 11 mm left ophthalmic segment, wide neck aneurysm. After discussion of treatment options, she underwent successful flow diverter therapy. Marked stasis was apparent in the aneurysm upon the conclusion of the case, but the ophthalmic artery remained patent. She reported retro-orbital headaches for approximately 10 days post procedure. No visual symptoms were noted at that time. Upon follow-up angiography at 6 months, there was no residual aneurysm, however the ophthalmic artery was occluded at the origin with a 25-30% in-stent stenosis. Five years later, she reported transient floaters in her vision. Repeat angiography demonstrated interval recanalization of the ophthalmic artery without any delay to the retina, and resolution of the mild in-stent stenosis. Ophthalmic complications in the literature related to stent coverage over the ophthalmic artery vary widely from 0-39.1%, although an overall rate of artery patency is high at 90%, indicating low morbidity.

Conclusions:

Ophthalmic artery occlusion is a possible complication associated with flow diverter treatment in the ophthalmic internal carotid artery segment. Delayed ophthalmic artery occlusion and recanalization following flow diverter treatment may be in the setting of neointimal development and remodeling. To the authors' knowledge, this is the first reported case of such angiographic findings.

Keywords: Aneurysm Embolization, Flow Diverter, Surpass, Embolization, Carotid

Financial Disclosures: The authors had no disclosures.

Elevated HbA1C is Not Associated With Poor Functional Outcome In Stroke Patients Post Endovascular Therapy

<u>Nastajjia A Krementz, MD</u>¹, Vasu Saini, MD¹, Sishir Mannava, MD¹, Melissa Bailey, MD¹, Elizabeth Jordan, BS¹, Nicole B Sur, MD¹, Mario Zamora, MD¹, Sebastian Diaz, MD¹, Luis Guada, MD¹, Dileep Yavagal, MD¹

¹University of Miami, Miami, Florida, USA

Introduction:

Recent studies have found hemoglobin A1C (HbA1C) to be an independent predictor of poor functional outcome in patients with ischemic stroke. The goal of this study was to evaluate the association between HbA1C, hospitalization complications, and functional outcome for patients undergoing endovascular therapy (EVT).

Methods:

EVT patients were identified from a prospectively collected stroke database maintained at our institution. We collected demographic patient data, HbA1C obtained during admission, NIHSS on admission and post EVT, hospitalization complications (including infections, deep vein thrombosis, myocardial infarction and acute kidney injury), hemorrhagic transformation, and functional outcome (mRS) at discharge. Primary outcome was mRS at discharge, while secondary outcomes included NIHSS, hospitalization complications, and hemorrhagic transformation.

Results:

From February 2015 to September 2018, 348 patients underwent EVT at our institution. Patient median age was 71 (IQR 22). Modified Rankin Scale (mRS) at baseline was 0 (IQR1), median admission and post EVT NIHSS was 16 (IQR 9) and 12 (IQR 15), respectively. Multivariate regression analysis showed HbA1C was positively associated with NIHSS on admission (p=0.035, 95% CI 0.003-0.76) and inversely related to mRS at baseline (p=0.007, 95% CI -0.662 - 0.110). Elevated HbA1C was also independently associated with myocardial infarction (p=0.008, 95% CI 0.267-1.785). Elevated levels of A1C were not associated with poor functional outcomes in EVT patients (p=0.683, CI -0.596 -0.906).

Conclusions:

HbA1C does not appear to predict poor functional outcomes in patients undergoing EVT. Elevated levels of HbA1C were positively correlated with higher NIHSS on admission and inversely related to mRS at baseline.

Keywords: Mechanical Thrombectomy, Pathophysiology

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS—E-Poster ONLY: PRIMARY CATEGORY – INTRACRANIAL ANEURYSM

E-Poster 113

Off-Label Use of The WEB Device

<u>Edgar A Samaniego, MD. MS</u>¹, Jorge A Roa, MD¹, Mario Zanaty, MD¹, Stavropoula I Tjoumakaris, MD², Nikolaos Mouchtouris, MD², Pascal Jabbour, MD², Ahmad Sweid, MD², Santiago Ortega-Gutierrez, MD, MSs¹, Kaustubh Limaye, MD¹, Khaled Asi, MD¹, David Hasan, MD¹, Edgar A Samaniego, MD¹

¹University of Iowa Hospitals and Clinics, Iowa City, Iowa, USA; ²Thomas Jefferson University Hospitals, Philadelphia, Pennsylvania, USA

Introduction:

We present our initial experience with the off-label use of the WEB device. It is an intrasaccular flowdiverter that does not require long-term antiplatelets and has emerged as an alternative to treat complex aneurysms.

Methods:

We performed a retrospective study from 2 institutions of patients with intracranial aneurysms who underwent treatment with WEB device alone or in conjunction with stenting and/or coiling. Patients were included in the study only if the device was deployed in an off-labeled location.

Results:

A total of 11 patients with 12 aneurysms were included. Ruptured aneurysms accounted for 4 (30.8%) cases. Off-labeled locations included 3 aneurysms in the posterior communicating artery (PCOM), 3 supraclinoid ophthalmic artery (OA), 2 pericallosal artery, 2 posterior inferior cerebellar artery (PICA), 1 vertebrobasilar junction, and 1 cavernous internal carotid artery (ICA). The mean dome-to-neck ratio was 1.91±0.9. The average duration of the procedure was 63.9±29.6 min. Femoral route was used in 61.5% and radial access in 48.5% of cases. Five procedures (41.7%) were performed under monitored anesthesia care. We had 1.33 attempts per aneurysm. WEB embolization was supplemented with coiling in 2 cases (16.67%) and stenting in 1 case (8.3%). Based on the 'OKM' grading scale, we report a rate of 0% for grade 1, 33.3% for grade 2 and 33.3% for grade 3. Post-procedural occlusion was complete in 4 (33.3%) and adequate in 8 (66.6%) patients. No procedure-related deaths or symptomatic complications were reported.

Conclusions:

The WEB device was successfully deployed in off-labeled locations, including PCOM, OA and pericallosal aneurysms. The efficacy of this usage must be evaluated in multicenter prospective studies, but we believe that our preliminary results are promising. Correct characterization of the aneurysm size and morphology, as well as awareness of possible adjunct treatments, are crucial for successful intervention.

Keywords: Aneurysm Embolization, Endovascular Therapy, New Innovation, New Technique

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS—E-Poster ONLY PRIMARY CATEGORY – INTRACRANIAL ANEURYSM

E-Poster 114

Flow Diverter Placement for a Giant Carotid Terminus Aneurysm via Open Carotid Exposure <u>Muhammad H Niazi, MD FACP</u>¹, Deanna M Sasaki-Adams, MD¹, Micheal Cools, MD¹, Martin Piazza, MD¹, Sten Y Solander, MD¹

¹University of North Carolina, Chapel Hill, North Carolina, USA

Introduction:

Pipeline Embolization Device (PED) is an approved flow diverter indicated for aneurysms of internal carotid artery from petrous segment to communicating segment. PED was initially FDA approved for Giant aneurysms and the indication expanded to small aneurysms later. Trans-femoral or trans-radial is the standard vascular access for these procedures. We present a novel approach to bypass some of difficult tortuous vascular anatomy to place PED.

Methods:

Case report

Results:

74 years old Female with remote history of subarachnoid hemorrhage and coil embolization of a giant right internal carotid artery terminus dissecting aneurysm via direct carotid puncture, presented with significant recurrence. Attempts made to access the aneurysm via tans-femoral and trans-brachial approach, were unsuccessful secondary to lack of ability to navigate in the tortuous vascular anatomy and fibromuscular dysplasia. After careful consideration, as patient was on dual antiplatelet therapy (DAPT) a carotid exposure and a carotid puncture under direct visualization was done. Vascular neurosurgery team performed a carotid exposure. Carotid bifurcation was exposed and direct puncture of the artery done just proximal to bifurcation and a 4F 6 cm sheath placed via Seldinger Technique. A micro catheter was subsequently advanced in to the M1 segment of the right middle cerebral artery over an micro guidewire and digital subtraction angiograms were obtained. A 4.25 x 25 mm PED was deployed from the proximal M1 segment of the right middle cerebral artery across the neck of the aneurysm. Follow-up arteriograms showed adequate placement and stagnation.

Conclusions:

Successful placement of the Flow diverter is a patient with very challenging vascular anatomy secondary to her fibromuscular dysplasia via carotid access under direct visualization. Direct percutaneous carotid puncture was not employed secondary to concerns for hemostasis in the setting of use of DAPT. This is a rare occurrence and a novel approach which can be used when needed.

Keywords: Aneurysm Embolization, Flow Diverter, Pipeline

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS—E-Poster ONLY PRIMARY CATEGORY – INTRACRANIAL ANEURYSM

E-Poster 115

Trends and Outcomes of Endovascular Techniques Versus Clipping of Unruptured Intracranial Aneurysms in ≥80 years

Jussie Lima, MD¹, Smit Patel, MD¹, Martin Ollenschleger, MD¹

¹Hartford Hospital, Hartford, Connecticut, USA

Introduction:

There are limited studies available to compare the outcomes for unruptured intracerebral aneurysms (UIA) with surgical clipping versus endovascular therapy in \geq 80 years. After advances of endovascular therapy, the outcomes have been changed even in \geq 80 years of age population. To better understand the recent trends in the use of and outcomes related to endovascular compared with clipping for UIA in the United States, we used a NIS sample.

Methods:

The UIA were extracted using ICD 9 CM code 437.3 from National Inpatient Sample 2002-2014. We excluded <80 years and ruptured aneurysms in our final pool of data. The weighted discharge was used to generate national estimates. Trends of utilization clipping and endovascular techniques were calculated using the regression model. Discharge outcomes were defined as discharged to home with/without services, facilities and died.

Results:

Total 57,793 unruptured intracranial aneurysms were extracted after excluding ruptured aneurysms (N=3,394) in \geq 80 yrs. Among them, octogenarian were 49,473 (85.6%), nonagenarian 8,245 (14.3%) and centenarian 74 (0.2%). There were 252 (0.4%) treated with clipping, 2,452 (4.2%) with endovascular and 55,089 (95.3%) untreated. The trend of unruptured aneurysms treated with endovascular increased from 1.07% in 2002 to 15.70% in 2014 (P <0.05), trend for clipping 3.79% in 2002 to 8.11% in 2014 (P=0.74). For endovascular, the patients discharged to home were 79.8% (1,955/2,452) vs. 46.5% (117/252) of coiled patients (P <0.05), discharged to facilities 17.7% (433/2,452) vs. 41.8% (105/252) of coiled patients (P <0.05), and mortality 2.6% (64/2,452) vs. 11.7% (30/252) of coiled patients (P <0.05).

Conclusions:

Despite studies suggesting a low risk of rupture of incidentally diagnosed cerebral aneurysms, this national database suggests considerably increasing trends of endovascular intervention in \ge 80 yrs. There are excellent outcomes reported in endovascular groups as majority patients were discharged to home and significantly lower mortality were reported compared to clipping groups.

Keywords: Aneurysm Embolization, Aneurysm, Coiling, Coiling, Neurointerventional Education

Financial Disclosures: The authors had no disclosures.

Clipping versus Coiling of Ruptured Intracranial Aneurysms in the Younger Population: A Meta-Analysis

<u>Giana Dawod, BS</u>¹, Nicholas D Henkel, BA¹, Harsh Desai, BS, MS¹, Hisham Salahuddin, MD¹, Mouhammad A Jumaa, MD¹, Alicia C Castonguay, PhD¹, Azedine Medhkour, MD²

¹Neurology, University of Toledo Medical Center, Toledo, Ohio, USA; ²Neurosurgery, University of Toledo Medical Center, Toledo, Ohio, USA

Introduction:

Ruptured intracranial aneurysms can be secured by endovascular coiling (EVC) or microsurgical clipping (MSC). Limited data exists on the best treatment modality in younger patients. We performed a metaanalysis to evaluate the safety, efficacy, and functional outcomes in patients ≤50 years old undergoing EVC or MSC for ruptured intracranial aneurysms.

Methods:

A systemic search of PubMed and EMBASE databases was completed searching for articles from 2002-2019. Six studies were found, encompassing 865 total patients. Included articles compared patients with an average age of ≤50 undergoing EVC or MSC for ruptured cerebral aneurysms. Outcomes of interest were: (1) functionality (mRS of 0-3, GOS 4 or 5) 2) safety (lack of perioperative or postoperative complications), and 3) efficacy (obliteration of aneurysm, lack of readmission, lack of re-bleeding). Statistical analyses were conducted in R (RStudio, Version 1.2.1335) using the meta package. Cochran's Q-Test and I² were used to assess heterogeneity. Publication bias was assessed using Funnel Plots and Egger's Test.

Results:

Three studies met inclusion criteria, which included 134 EVC patients and 156 MSC patients. Ten percent (12/121) of EVC patients and 26% (33/129) of MSC patients reported complications. With a substantial level of heterogeneity, the random-effects model was not statistically significant (OR = 3.63; 95% C.I.: 0 – 58555.4913, p = 0.3812). Efficacy of intervention showed no difference (OR = 0.49; 95% C.I.: 0.16 – 1.52, p = 0.2205). Good functionality occurred in 86% (134/156) and in 77% (103/134) of EVC and MSC patients, respectively (OR = 1.83; 95% C.I.: 0.97 – 3.42, p = 0.0602). There was no evidence of publication bias.

Conclusions:

Despite current literature favoring EVC, there is no significant difference in safety, efficacy, or functional outcomes in patients ≤50 years old undergoing EVC or MSC for ruptured intracranial aneurysms. Further studies are warranted to understand best treatment modality in this population.

Keywords: Aneurysm, Clipping, Coiling, SAH

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS—E-Poster ONLY PRIMARY CATEGORY – INTRACRANIAL ANEURYSM

E-Poster 117

Multi-center Comparison of Transradial Access for Flow-Diversion Treatment with Transfermoal Access: A Feasible Alternative.

<u>Pratit Patel, MD¹</u>, Rakesh Khatri, MD², Priyank Khandelwal, MD¹, Neil Majmundar, MD¹, Gustavo Rodriguez, MD², Alberto Maud, MD², Vincent Dodson, BS¹, Amit Singla, MD¹, Salvador Cruz-Flores, MD², Anantha Vellipuram, MD²

¹Rutgers University, Newark, New Jersey, USA; ²Texas Tech University, El Paso, USA

Introduction:

We Report multi-institutional experience with TRA (trans-radial approach) for placement of flow diverting stents (FD)in the anterior circulation as a feasible alternative to TFA(trans-femoral approach) and provide a direct comparison with the traditional TFA.

Methods:

Retrospective review of prospectively collected institutional database of FD placement for embolization of the anterior circulation aneurysm were analyzed at two Neuro-endovascular centers from 2016-2019. Patient demographics, location and size of the aneurysm, dimensions of the flow-diverter implant, and fluoroscopic time, complications and length of in hospital stay were recorded.

Results:

Total of 96 subjects underwent placement of FD in the anterior circulation. Out of which 38 via TRA and 58 via TFA were included. The average age of the patients was 57 years old in TRA group and 53 in TFA group. 85% female in TRA and 80% in TFA. A total of 8 cases (out of 38) the TRA were not suitable because of a small radial artery (less < 2.3 mm) or lack of support in order to advance the flow diverting stent safely; and were converted to the TFA. All 8 were left ICA aneurysms. A total of 3 subjects (5.6%) in TFA group suffered from hemorrhagic complications at the access site including one case of large retroperitoneal hematoma; none in TRA. The average size and length of the implant was comparable in both groups and the amount of radiation exposure was not different in the transradial versus transfemoral approach. The average length of hospital stay for the TRA group was one day compared to three days in the TFA group.

Conclusions:

TRA is feasible alternative to TFA for flow-diverting stent placement in anterior circulation. Higher rates of conversion to alternative approach were noted with TRA, however, less risk of hemorrhagic complications compared to TFA were observed.

Keywords: Flow Diverter

Financial Disclosures: The authors had no disclosures.

RESEARCH ABSTRACTS—E-Poster ONLY: PRIMARY CATEGORY – INTRACRANIAL ANEURYSM

E-Poster 118

Factors contributing to angular remodeling in stent assisted coiling (SAC) of bifurcation aneurysms <u>Nada Elsaid, Dr</u>¹, Ahmed Saied, Dr¹, Krishna Joshi, Dr², Mohamed Gomaa, Dr¹, Talal Amer, Dr³, Mohamed Saad, Dr¹, Demetrius Lopes, Dr⁴

¹Department of Neurology, Mansoura University, Mansoura, Egypt., Mansoura, Egypt; ²Department of Neurosurgery, Rush University Medical Center, Chicago, Illinois, USA; ³Department of Radiology, Mansoura University, Mansoura, Egypt., Mansoura, Egypt; ⁴Advocate Aurora Health, Aurora, USA

Introduction:

Stent assisted coiling leads to significant changes in the vascular angle altering the bifurcation geometry and change the hemodynamics at the bifurcation apex. It is believed that the stent alone exerts this effect without studying the effect of the other possible factors.

Methods:

We reviewed 43 basilar and carotid bifurcation aneurysms treated by SAC using Neuroform, Enterprise, and Lvis stents. The bifurcation angle between the mother and stented daughter vessel was measured in 4 settings: pre-treatment, post-stenting, post-coiling, and at delayed follow-up(6-12 months). The degree of stent-induced angular remodeling was calculated by subtraction of the post-stenting bifurcation angle from the pretreatment one, while the coil-induced angular remodeling was calculated as the difference between the post-coiling and post-stenting bifurcation angle. The immediate post-procedural angular remodeling degree is the sum of the stent and coil induced angular remodeling. We studied the effect of different factors including the pretreatment bifurcation angle, aneurysm site, parent vessel diameter, stent type, stent length in the daughter vessel, post-operative actual coils size, and packing density.

Results:

The mean degree of stent-induced angular remodeling was 10.2(0-47), coil-induced angular remodeling was 4.53(-7-30), immediate post-procedural angular remodeling was 14.8(-4-47), and delayed angular remodeling was 4.75(-12-40). Degree of immediate remodeling was significantly affected by the actual in-situ coil size(P=0.017), and the pretreatment bifurcation angle(p=0.024). Linear regression was done and the pre-treatment bifurcation angle was defined as a predictor. The degree of delayed remodeling is significantly affected only by the pretreatment bifurcation angle(p=.011)

Conclusions:

Immediate angular remodeling following SAC of bifurcation aneurysms can happen after stenting or coiling or both. Coils may represent as an additional factor beside the stent in inducing immediate angular changes; this effect is correlated to the coils size. Pretreatment bifurcation angle is most consistent factor affecting the degree of both the immediate and delayed angular remodeling.

Keywords: Aneurysm, Stent Assisted

Financial Disclosures: The authors had no disclosures.

Analysis of factors affecting the recanalization rates of bifurcation aneurysms treated with stentassisted coiling (SAC)

<u>Nada Elsaid, Dr</u>¹, Ahmed Saied, Dr¹, Krishna Joshi, Dr², Mohamed Gomaa, Dr¹, Talal Amer, Dr³, Mohamed Saad, Dr¹, Demetrius Lopes, Dr⁴

¹Department of Neurology, Mansoura University, Mansoura, Egypt., Mansoura, Egypt; ²Department of Neurosurgery, Rush University Medical Center, Chicago, Illinois, USA; ³Department of Radiology, Mansoura University, Mansoura, Egypt., Mansoura, Egypt; ⁴Advocate Aurora Health, Aurora, USA

Introduction:

SAC is routinely used in the treatment of wide-necked bifurcation aneurysms. In some bifurcation aneurysms, a single stent may be able to bridge the neck and protect the mother branch (MB) from coil herniation. To this date, it is unclear if the choice of the daughter branch (DB) for bifurcation stenting affects the success of aneurysm occlusion during follow-up. Also, there is no reporting of the relation between the degree of angular remodeling and the angiographic outcomes. The study aimed to analyze the factors that may affect the daughter branch (DB) selection for stent deployment using a single SAC in the treatment of bifurcation site aneurysms with regard to recanalization at the latest follow-up.

Methods:

We reviewed 43 consecutive unruptured bifurcation aneurysms treated with single SAC involving the basilar tip and carotid terminus treated by single SAC with respect to recanalization at latest follow-up (median 12 months).Beside the aneurysm geometry and the treatment-related factors (stent type, initial RG, packing density, and the degree of induced angular remodeling) we analyzed three categories of factors that may affect DB selection including pretreatment bifurcation angle, MB/DB diameter ratio, and lastly the anatomical relation of the neck to the stented DB using a newly introduced parameter; the bifurcation index (BI = bifurcation span across which the stent was deployed into DB/bifurcation span of the other DB).

Results:

Angiographic recanalization was observed in 7 aneurysms (16.3%). Large aneurysm size and low BI correlated significantly (p=0.05) with recanalization. Pretreatment bifurcation angle, MB/DB diameter ratio, and degree of angular remodeling didn't correlate with recanalization.

Conclusions:

During planning for single SAC in basilar tip or carotid terminus aneurysms, DB selection for stent deployment is crucial and it's important to consider the "Bifurcation Index". Stent deployment in DB across the long bifurcation span seems to be related to better angiographic outcomes.

Keywords: Aneurysm

Financial Disclosures: The authors had no disclosures.

RESEARCH ABSTRACTS—E-Poster ONLY PRIMARY CATEGORY – INTRACRANIAL ANEURYSM

E-Poster 120

Can Patients' Specific Computational Flow Dynamic Model Predict Rupture Point in Complex Bilobed Cerebral Aneuyrsm?

Aser Gomaa, Fellow¹, Ossama Yassin, Professor¹

¹Alexandria university, Alexandria, Egypt

Introduction:

CFD is becoming an important tool in studying intracerebral aneurysms. This important tool can be put in action not only to study the behavior of the aneurysms but to predict the rupture point and factors affecting it

Methods:

Case series of 12 complex bilobed aneurysms were studied, selective 3D angiography was done using Siemens Health care Artis-Zee, Mapping of patient specific vasculature is done in real time operation of the Siemens ARTIS-Z angiography workstation. Then, proper cropping and enhancement of the area of interest (AOI) is done using the Siemens software. The CFD modeling and simulation is done using ANSYS FLUENT V16 package, where a wide variety of flow models and solvers are available to suite different hemodynamic scenarios. The results are then analyzed via CFD-Post to identify rupture risk indices and other hemodynamic markers.

Results:

The blood flow streamlines showed different pattern within the same anuersym, the streamlines showed maximum velocity in the lobe in direct contact with blood stream while the daughter sac showed low velocity with turbulent flow, which was reflected on the Wall shear stress values where areas with turbulent flow showed the least WSS values while the areas with steady high velocity flow showed high WSS values. Low WSS were found at the tip of the dome of probable ruptured lobe.

Conclusions:

The current findings support that WSS is an important factor affecting the rupture in cerebral aneurysm. Complex bilobed aneurysms show different WSS values within same aneurysm.Daughter sac shows low WSS values due to turb ulent flow which is the probable of rupture point within aneurysm.

Keywords: Intracerebral Aneurysm, Vascular Imaging, Pathophysiology

Financial Disclosures: The authors had no disclosures.

RESEARCH ABSTRACTS—E-Poster ONLY PRIMARY CATEGORY – INTRACRANIAL ANEURYSM

E-Poster 121

Management of Middle Cerebral Artery Aneurysms: A Single Center Experience

<u>Pankajavalli Ramakrishnan, MD, PhD</u>¹, Forrest Robertson, BA Candidate², Christopher Bazemore, BS³, Wolfgang Leesch, MD¹, J. Frank Sanderson, MD¹, Dean Kostov, MD¹

¹*Riverside Regional Medical Center, Newport News, Virginia, USA;* ²*Virginia Polytechnic Institute, Blacksburg, Virginia, USA;* ³*Christopher Newport University, Newport News, Virginia, USA*

Introduction:

Treatment of MCA location aneurysms have historically been in the purview of surgical clip ligation. However, emerging data in the literature suggests that endovascular coiling of these aneurysms might be safe, feasible, and effective.

Methods:

In this single center retrospective study, we present our experience in the management of MCA location aneurysms since 2007 and their outcomes. We identified 44 patients with 45 MCA location aneurysms from our collective database. Clinical characteristics, demographics, aneurysm angioarchitecture, management strategy, complications, and follow-up data were collected.

Results:

The median age of the patients in the overall cohort was 61, with nearly 85% women. Out of the 45 aneurysms, 27 aneurysms were unruptured, and 18 presented with acute rupture. Amongst the unruptured cohort, 12 were managed conservatively by observation. Endovascular coil embolization was undertaken primarily, or with balloon or stent assistance in 14/15 unruptured aneurysms, and in 13/18 ruptured aneurysms. Surgical clip ligation was undertaken in 3 of the unruptured aneurysms and in 4 patients with ruptured aneurysms. Intraprocedural re-rupture was observed in 1 case, and 1 case each with coil protrusion without ischemic sequalae. No major intraprocedural complications were seen in the unruptured cases treated with clip ligation or endovascular treatment. Independent neurologic recovery of mRS of 0-2 at 90 days was seen in 82.2% in the overall cohort. Over a 12 month median follow up interval, there was one case of recurrence in the unruptured but treated cohort, whereas 5 cases of recurrence within the ruptured cohort. Retreatment was undertaken with clip ligation for 2 cases, endovascular coiling in 2 cases, and observation in the remaining 2 cases.

Conclusions:

In our retrospective study of MCA aneurysm management, endovascular coil embolization was safe, and successful and demonstrated a good durability of treatment.

Keywords: Aneurysm, MCA, Aneurysm Embolization

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS—E-Poster ONLY: PRIMARY CATEGORY – ISCHEMIC STROKE

E-Poster 78

Intensive Care Unit Complications and Outcomes in Mechanical Thrombectomy for Acute Ischemic Stroke

<u>Sishir Mannava, M.D.</u>¹, Vasu Saini, M.D.¹, Nastajjia Krementz, M.D.¹, Melissa Bailey, M.D.¹, Mario Zamora, M.D.¹, Luis Guada, M.D.¹, Juan S Diaz, M.D.¹, Daniel Kogan, M.D.¹, Elizabeth Jordan, B.S.¹, Nicole Sur, M.D.¹, Dileep Yavagal, M.D.¹

¹University of Miami Miller School of Medicine, Miami, Florida, USA

Introduction:

Although trials have demonstrated efficacy of mechanical thrombectomy (MT) in large vessel occlusion acute ischemic strokes (LVO AIS), there is a dearth of literature on the impact of intensive care unit (ICU) complications in mechanical thrombectomy patients. We hypothesized that ICU complications post-MT such as respiratory failure necessitating tracheostomy, percutaneous gastrostomy tube (PEG) placement, hemicraniectomy, and infections can negatively impact stroke outcomes and mortality.

Methods:

Between February 2015 and September 2018, 348 consecutive patients who underwent attempted MT for LVO AIS were retrospectively analyzed for baseline characteristics, cerebrovascular risk factors, ICU length of stay (LOS), intubation days, hospital LOS, and ICU complications such as tracheostomy placement, percutaneous gastrostomy tube (PEG) placement, myocardial infarction (MI), hemicraniectomy, deep vein thrombosis (DVT) or pulmonary embolism (PE), acute kidney injury (AKI), dialysis, pneumonia, and urinary tract infection (UTI). Statistical analysis was conducted using univariate and multivariate regression models and outcomes were adjusted for demographics, baseline characteristics, and peri-procedural and systemic complications. We chose to analyze the association between the above noted variables with increased hospital LOS and inpatient mortality.

Results:

Age, NIH stroke scale (NIHSS) on admission, tracheostomy placement, PEG placement, dialysis, and UTI were significantly (p value < 0.05) associated with increased hospital LOS. Hemicraniectomy had a trend towards significance for increased hospital LOS (p=0.096). Interestingly however, ICU complications such as infection, DVT or PE, MI, PEG placement, tracheostomy, hemicraniectomy, AKI, and dialysis use were not significantly associated with inpatient mortality. Intra-arterial tpa use, hemorrhagic conversion of stroke, higher a1c on admission, and higher absolute NIHSS post-MT were significantly (p value <0.05) associated with inpatient mortality.

Conclusions:

These findings highlight the importance of post-mechanical thrombectomy management and care in the ICU, with early and aggressive prevention of complications such as tracheostomy, PEG placement, dialysis, and UTI in order to avoid prolongation of hospital stay.

Keywords: Acute Ischemic Stroke Intervention, Cerebrovascular Disease, Endovascular Therapy

Financial Disclosures: The authors had no disclosures.

Association of 24-hour Blood Pressure Parameters Post-Thrombectomy with Symptomatic Intracerebral Hemorrhage

Taha Nisar, MBBS¹, Toluwalase Tofade, MBBS², Priyank Khandelwal, MBBS²

¹Montefiore Medical Center, The Bronx, New York, USA; ²Rutgers New Jersey Medical School, Newark, New Jersey, USA

Introduction:

Higher blood pressure (BP) post-mechanical-thrombectomy (MT) can potentially restore perfusion to the ischemic brain tissue, but it comes at a risk of causing symptomatic intracerebral hemorrhage (sICH). The ideal BP in the 24-hour range after MT has been understudied. We investigated the association of different BP parameters post-MT with the development of sICH post-MT at a tertiary care center.

Methods:

We performed a retrospective chart review of adult patients who underwent MT for an anterior circulation large vessel occlusion at a comprehensive stroke center from July 2014 to March 2018. We averaged the BP values every hour over a period of 24-hours post-MT. A binary logistic regression analysis was performed, controlling for age, pre-thrombectomy NIHSS-scores, thrombolysis in cerebral infarction (TICI)-scores, duration to thrombectomy, with the BP parameters as the predictors. The primary outcome was the development of sICH. SICH was defined as an intracerebral hemorrhage (ICH) that causes worsening of NIHSS score by \geq 4 points post-IV-rtPA.

Results:

69 patients met our inclusion criteria. 39 (56.52%) patients were male. The mean age was 64.80±14 years. 5 (7.24%) patients developed sICH. In the logistic regression model, the parameters of higher mean systolic BP (136.84±14.65 vs. 135.59±14.76; OR, 1.01; 95% CI, 0.93-1.1; P 0.816), higher mean diastolic BP (72.96±10.75 vs. 71.05±8.66; OR, 0.96; 95% CI, 0.83-1.11; P 0.532), higher mean arterial pressure (82.33±16.36 vs. 80.16±21.7; OR, 0.96; 95% CI, 0.89-1.04; P 0.311) and wider pulse pressure (65.79±20.34 vs. 62.62±14.57, OR, 1.04; 95% CI, 0.94-1.14; P 0.5) were not significantly associated with the development of sICH post-MT.

Conclusions:

Our study concludes that mean systolic, diastolic, and mean arterial BP and pulse pressure values are not significantly associated with the development of sICH post-MT.

Keywords: Blood Pressure Management In Acute Stroke, Intracerebral Hemorrhage, Mechanical Thrombectomy

Financial Disclosures: The authors had no disclosures.

The characteristics of patients who underwent decompressive craniectomy due to acute ischemic stroke

<u>Byung-rae Cho, clinical asst. professor</u>¹, Byung-Hoo Moon, Clinical asst. prof.², Sang-Kyu Park, Clinical Professor³, Dong-kyu Jang, Associated professor², Kyung-sool Jang, Professor²

¹Eunpyeong St. Mary's Hospital, The Catholic University of Korea, Seoul, Korea (Republic of); ²Incheon St. Mary's Hospital, The Catholic University of Korea, Incheon, Korea (Republic of); ³Kangnam Severance Hospital, Yonsei University, Seoul, Korea (Republic of)

Introduction:

Decompressive craniectomy (DC) is a life-saving surgical procedure being increasingly employed for malignant intracerebral artery stroke. The purpose of this study is to investigate the characteristics and prognostic factors of patients undergoing DC after acute ischemic stroke

Methods:

From 2013 to 2018, we analyzed the prospective gathered data of 58 consecutive patients treated with DC after acute ischemic stroke in a single center. Also, we analyzed the prospective gathered data of 160 consecutive patients treated with mechanical thrombectomy using stent-retrievers for acute ischemic stroke in a single center.

Results:

Of the total 3884 acute ischemic stroke patients, 58 patients (1.49%) were underwent DC. Of 289 patients who underwent mechanical thrombectomy due to acute ischemic stroke, DC was performed in 32 patients (11.07%). Of the patients who underwent mechanical thrombectomy due to acute ischemic stroke, post thrombectomy complications (100% vs 22.81%, p=0.000), preprocedural TICI grade (p=0.001) were significantly higher in patients who underwent DC compared to patients who did not receive craniectomy. 30 days mRS scores (5.13 vs 3.37, p=0.000), 90 days mRS scores(5.06 vs 3.17, p=0.000), ICU hospital days(21.53 vs 8.65, p=0.000) and hospital mortality(46.88% vs 12.5%, p=0.000) were significantly higher in the craniectomy patients.

Conclusions:

Patients who underwent DC had more post procedural complications, and the functional outcomes were worse after DC in acute ischemic stroke. However, since DC is the last treatment option for patients with severe cerebral infarction who are not responding to medical treatment, it is advisable to consider active management while managing the underlying disease and periprocedural complications.

Keywords: Acute Stroke, Mechanical Thrombectomy, Hemorrhagic Transformation, ICH

Financial Disclosures: The authors had no disclosures.

Endovascular Management Of Acute Large Vessel Occlusion Stroke In Pregnancy Is Safe And Feasible <u>Kaustubh Limaye, MD</u>¹, Ann Van De Walle Jones, MD¹, Amir Shaban, MD¹, Shashvat Desai, MD², Sami AlKasab, MD³, Santiago Ortgea-Gutierrez, MD¹, Diogo Haussen, MD⁴, Raul Nogueira, MD⁴, Carlos Ragiotto, MD⁵, Leticia Rebello, MD⁶, Francicso Mont'Alverne, MD⁷, Tudor Jovin, MD², David Hasan, MD¹, Ashutosh Jadhav, MD⁸

¹The University of Iowa, Iowa city, Iowa, USA; ²Cooper University Hospital, Camden, New Jersey, USA; ³MUSC, Charleston, South Carolina, USA; ⁴Emory University, Atlanta, Georgia, USA; ⁵Hospitas das Clinicas Samuel Libania, Pouso Alegre, Brazil; ⁶Hospital Brasilia, Brasilia, Brazil; ⁷Hospital General De Fortaleaza, Fortaleza, Brazil; ⁸University of Pittsburgh, Pittsburgh, Pennsylvania, USA

Introduction:

Stroke is a leading cause of adult death and disability. Although stroke in pregnancy is a rarity it has devastating consequences on the life of the mother and the unborn child. As pregnancy was an exclusion in all of the acute stroke treatment trials there is no clinical trial data to recommend evidence based treatment in this important subgroup.

Methods:

We sent inquiries to high volume centers in US and rest of the world and seven centers had subjects meeting our criteria. After IRB approval, a retrospective analysis of prospectively maintained stroke and endovascular databases was performed. Acute ischemic strokes due to large vessel occlusion in pregnancy between 2000-2019 who were treated with mechanical thrombectomy were identified.

Results:

A total of seven subjects were identified who matched the inclusion criteria for this study. Initial NIHSS ranged between 9-28. Three of seven women received IV t-PA before mechanical thrombectomy. Techniques of intra-arterial therapy varied in seven patients which included mechanical aspiration, stent retriever thrombectomy, stent assisted continuous aspiration, a direct aspiration first pass technique (ADAPT) and in one mechanical aspiration followed by two attempts with stent retriever thrombectomy and finally requiring a rescue stent. This subject had received IV t-PA before mechanical thrombectomy. No symptomatic hemorrhages were noted in this series. Discharge NIHSS average 1.7 (range 0-5). All seven women had good outcome (mRS<2) at 3 months without procedural or safety concerns.

Conclusions:

In this largest single series of endovascular therapy in pregnant women we found that mechanical thrombectomy is a safe and effective treatment for acute stroke secondary to large vessel occlusion in our sample. We recommend that it should be considered for pregnant women presenting with large vessel occlusion stroke as long as the other inclusion criteria are met.

Keywords: Acute Ischemic Stroke Intervention, Mechanical Thrombectomy, Cerebrovascular Disease

Financial Disclosures: The authors had no disclosures.

E-Poster 125

Mechanical Thrombectomy in the Oldest of the Old: a Propensity Score-Matched Analysis <u>Shashank Agarwal, MD¹, Jeffrey Huang, MD¹, Koto Ishida, MD¹, Howard Riina, MD¹, David Turkel-Parella, MD¹, Jeremy Liff, MD¹, Jeffrey Farkas, MD¹, Karthikeyan Arcot, MD¹, Jennifer A Frontera, MD¹</u>

¹New York University Langone Health, New York, New York, USA

Introduction:

The 5 seminal mechanical thrombectomy (MT) trials had a median age of 68 years. Though some of these trials included nonagenarians, there is little data on their outcomes. We aimed to compare the procedural, discharge outcomes and complications, of MT for acute ischemic stroke (AIS) in nonagenarians versus younger patients(≤69)

Methods:

Patients with AIS admitted to two comprehensive stroke centers were enrolled prospectively in a registry. Rates of MT were compared between nonagenarians vs ≤69. Among those who underwent MT, procedural outcomes, complications, and discharge disposition were compared in propensity scorematched groups (matched for NIHSS, pre-stroke mRS, IV-tPA administration and TICI grade≥2b) of nonagenarians to patients≤69. Good discharge disposition was defined as discharge to home/acute rehabilitation.

Results:

Of the 3010 AIS patients, 46/297 (16%) nonagenarians underwent MT compared to 159/1337 (12%) patients ≤ 69 (P=0.091) with TICI $\geq 2b$ of 89% vs 94%; p=0.238 respectively. 78 patients (N=39 ≥ 90 , N=39 ≤ 69) were propensity score-matched with a median admission NIHSS of 22 and 19, and median ASPECTS of 9 and 9, respectively (both P>0.05). Those ≤ 69 more often had M1 occlusions than nonagenarians (84% vs 50%, P=0.035), whereas ICA (10% vs 13%, p=0.76), and M2 (21% vs 43%, p=0.19) occlusions were similar between the two groups. Time to groin puncture (100 ± 65 vs 76 ± 34 ; p=0.124), revascularization time (134 ± 72 vs 110 ± 54 ; p=0.145), complication rates (0 vs 5.1%; p=0.494) and inhospital deaths (11% vs 24%; p=0.155) were similar among the two groups. 44% of nonagenarians had good discharge disposition, compared to 51% of patients ≤ 69 years (p=0.650)

Conclusions:

We present one of the largest series of MT among nonagenarians with 89% successful recanalization rates. In propensity score analysis almost half of nonagenarians (44%) were discharged to home/rehab, which is comparable to a younger cohort (51%). Aggressive management is warranted in the oldest of the old.

Keywords: Acute Ischemic Stroke Intervention, Acute Stroke, Endovascular Therapy, Revascularization, Mechanical Thrombectomy

Financial Disclosures: The authors had no disclosures.

E-Poster 126

Cone-beam CTA by IV-contrast is reliable to evaluate patients with LVO <u>Nobuaki Yamamoto, Dr.</u>¹

¹Department of neurology, Tokushima university, Tokushima, Japan

Introduction:

We speculated that the time required for the diagnosis of AIS might be reduced if we could determine MT eligibility in patients with ELVO at angiography-suites (AS). Modern angiography-suites with flat panel detectors can perform cone beam (CB)-CT. We performed CB-CTA using intravenous injection of contrast agent to evaluate occlusion sites, collateral score, and construction of vessels distal to occlusion sites and determined if CB-CTA could be useful to evaluate patients with ELVO.

Methods:

We included 15 patients with ELVO and successful recanalization by MT, and investigated whether CB-CTA was reliable to diagnose occlusion sites and collateral score on CB-CTA by comparison of factors between favorable and unfavorable outcome groups. We administered contrast (Iodixanol, 270mg/mL) intravenously at a rate of 3mL/s for 20 seconds by using a power injector prior to starting CB-CT scanning. Twenty seconds after injection, we started to scan on CB-CT.

Results:

There was strong agreement of occlusion sites between CB-CTA and conventional radiological examination (κ = 0.80). Collateral score determined by CB-CTA was significantly different between favorable outcome and unfavorable outcome group (median collateral score 2.3 v.s. 1.3, p = 0.029).

Case	Sex	Age	tPA use	NIHSS	OS on DSA	OS on CB-CTA	Collateral score	Prognosis
1	Female	94	Yes	7	Left M2	Left M2	2	Favorable
2	Male	69	No	11	Right M1	Right M1	2	Unfavorable
3	Male	48	No	5	Right M1	Right M1	з	Favorable
4	Male	48	No	6	Right M1	Right M1	з	Favorable
5	Male	87	Yes	10	Left M1	Left M1	з	Favorable
6	Male	71	No	13	Right M2	Right M2	2	Unfavorable
7	Male	81	Yes	12	Left M1	Left M1	2	Unfavorable
8	Male	67	No	12	Right M2	Right M1	1	Unfavorable
9	Male	67	No	15	Right M2	Right M2	1	Unfavorable
10	Female	71	No	26	Right IICA	Right IICA	1	Favorable
11	Female	87	Yes	26	Left M2	Left M3	2	Favorable
12	Female	89	Yes	29	Right IICA	Right IICA	o	Unfavorable
13	Female	76	No	2	Left M2	Left M2	2	Favorable
14	F	82	Y	16	Left M1	Left M1	2	Favorable
15	F	76	N	14	Left M2	Left M1	1	Unfavorable

PRIMARY CATEGORY – ISCHEMIC STROKE



A 76-year-old woman with right hemiparesis and aphasia was admitted to our hospital. A diffusionweighted image (DWI) and MRA shows unclear infant area (A) and distal MI occlusion (B). CB-CTA also shows distal MI occlusion (arow head) and good collatenals (white clucle). A digital substation angiography shows distal MI occlusion (D-1) and complete recardination was obtained after mechanical thronfrectomy (D-2). DWI 2 days after MT shows a spotty high-intense lesion (F).



An 81-year-old woman with left hemiparesis was admitted to our hospital. A diffusionweighted image (DW1) and MRA shows slight high-intensity signals at the right hemisphere (A) and a right internal carotid artery (ICA) occlusion (B). CB-C1A also shows intracranial ICA occlusion (arrow head) and good collaterals (white circle). KA occlusion is confirmed on digital subtraction angiography (D-1) and complete recanalization is obtained after mechanical thrombectomy (D-2). Three-dimensional reconstructed cone-beam computed tomography angiography shows a cerebral aneurysm at distal to occluded sites (white arrows, E). DW12 days after MT shows a restricted highintensity lesion (F).

Conclusions:

CB-CTA performed in an AS might be useful to evaluate patients with ELVO.

Keywords: Acute Ischemic Stroke Intervention, Revascularization, Collateral, Vascular Imaging

Financial Disclosures: The authors had no disclosures.

E-Poster 127 EXPERIENCE WITH AUTONOMOUS TCD ROBOTIC SYSTEM FOR PFO DETECTION IN EMBOLIC STROKE OF UNDETERMINED SOURCE

Ruchir Shah, MD¹, Thomas Devlin, MD, PhD²

¹Erlanger Health Science Institute, Chattanooga, Tennessee, USA; ²Erlanger Health Institute, Chattanooga, Tennessee, USA

Introduction:

Right to Left shunting through PFO is a risk factor for ischemic stroke and commonly screened in cases of ESUS. With emerging evidence of PFO closure for reduction of recurrent stroke, there is a need for broader access to accurate, easily repeatable tools to identify high-risk patients considered for PFO closure. The use of Transcranial Doppler (TCD) bubble study has proven to be valuable, non-invasive tool due to its high sensitivity and specificity in detecting/grading PFO. In this case series, we evaluate a autonomous rTCD to perform bubble studies in ESUS population to assess the presence of PFOs

Methods:

Total 34 patients were diagnosed with ESUS. All patients received rTCD bubble study using the Lucid Robotic System to search, insonate and monitor bilateral MCAs signals. Transthoracic Echocardiogram (TTE) with bubble was completed in 29 of 34 patients. A Transesophageal Echocardiogram (TEE) was completed in 5 of 34 patients. All studies were performed at rest and with Valsalva maneuver. Some patients were selected for an rTCD after a positive TTE bubble study

Results:

A PFO was detected in 65% (22 of 34) of the patient. Both rTCD and TTE were performed in 19 of 22 patients. We identified 9 patients (47%) that had a positive rTCD bubble study which went undetected by a TTE bubble study. In these 9 patients, 56% had ICC grade 3, 33% grade 2, and 11% grade 1 shunt

Conclusions:

High sensitivity and specificity of TCD for the detection of a PFO provide a valuable, underutilized tool to accurately screen for high-risk patients benefiting from PFO closure. This is highlighted by the 9 patients where a PFO went undetected by TTE. The implementation of a fully autonomous rTCD allowed for broader access to perform TCD bubble studies, resulting in greater patient management. Due to small number, further research is recommended.

Keywords: TCD, Acute Stroke, New Technique, Diagnostic Neuroradiology

Financial Disclosures: The authors had no disclosures.

E-Poster 128

Safety of Cangrelor in Emergency Endovascular Stroke Recanalization, A Single Center Experience <u>Husitha Reddy Vanguru, MBBS</u>¹, Karen C Albright, PhD, DO, MPH¹, Rashid Ahmed, MD¹, Grahame C Gould, MD¹, Hesham Masoud, MBBCh¹, Julius Gene Latorre, MD, MPH¹

¹SUNY Upstate Medical University, Syracuse, New York, USA

Introduction:

Expanded patient eligibility for mechanical thrombectomy (MER) has resulted in an increase of ischemic stroke patients who require urgent stenting (0-48h) to achieve recanalization. Post-stenting antiplatelet medication management continues to remain a challenge due to lack of immediate effect and rapid reversibility ideal for patients at high risk of stent thrombosis and hemorrhagic complications, especially after intravenous thrombolysis (tPA). Cangrelor is an immediate-acting intravenous P2Y12 receptor inhibitor with rapid clearance and restoration of normal platelet function within one hour of infusion termination. We describe our preliminary experience with administering cangrelor in patients undergoing MER and requiring urgent stenting as rescue therapy.

Methods:

We performed a retrospective cross-sectional study of patients who underwent MER and required urgent stenting as rescue therapy from 6/2016-5/2019. We compared the cangrelor group to the group using other antiplatelet agents (eptifibatide, abciximab, aspirin, clopidogrel) using Chi squared (or Fisher's exact) and independent samples t-tests (or nonparametric equivalent). IRB exemption was obtained prior to data collection.

Results:

Twenty-one patients underwent MER and required urgent stenting as rescue therapy (cangrelor n=9, other agents n=12). There were no significant differences in age, comorbidities, NIHSS on presentation, IV t-PA use, or stent location. A larger proportion of patients in the cangrelor group were on an antiplatelet agent at home. In the group receiving other antiplatelet agents, 33% experienced restenosis as compared to 0% in the cangrelor group. Outcomes were similar in both groups. (Outcome details will be shown)

Conclusions:

Cangrelor may be a safe alternative to the current antiplatelet drugs in the immediate perioperative period among MER patients requiring urgent stenting, including tPA patients and those at high-risk for malignant cerebral edema or hemorrhagic transformation. Additional study is required to confirm or refute our observations.

Keywords: Antiplatelet, Acute Ischemic Stroke Intervention

Financial Disclosures: The authors had no disclosures.

E-Poster 129

Disabling Stroke In The Already Disabled: Ethical Dimensions and Directives

<u>Michael J Young, MD, MPhil¹</u>, Robert Regenhardt, MD, PhD¹, Michael Stein, JD, PhD², Thalebe Leslie-Mazwi, MD¹

¹MGH-Harvard Medical School, Boston, Massachusetts, USA; ²Harvard Law School, Boston, USA

Introduction:

Over a third of individuals presenting with strokes are estimated to have a pre-existing disability. Despite unprecedented advances in stroke research and clinical practice over the past decade, approaches to acute stroke care for persons with pre-existing disability have received scant attention. We aimed to investigate the conceptual and ethical underpinnings and implications of this gap in research and clinical practice, with particular attention to prevailing practices around decisions to provide or withhold acute therapies (tPA or endovascular thrombectomy) in caring for patients with pre-existing disability presenting with acute ischemic stroke.

Methods:

Normative ethical analysis is employed to systematically evaluate the underpinnings and implications of biases involving persons with disability in stroke research and practice. The bioethical principles of beneficence, non-maleficence, justice and autonomy are explicated, and their application to decision procedures around withholding tPA or endovascuar therapy for patients with pre-existing disability is explored. Recent insights from bioethics, disability rights research, and health law are explained and rigorously evaluated in the context of prevailing research and clinical practices in contexts of treating disabling stroke in the already disabled.

Results:

Current standards of research and clinical practice are influenced by an underexplored range of biases that may hinder acute stroke care for persons with disability. These trends may exacerbate unequal health outcomes by rendering novel stroke therapies inaccessible to many persons with disabilities.

Conclusions:

Allowing disability to drive decisions to withhold acute stroke interventions may perpetuate disparate health outcomes and undermine ethically resilient stroke care. Advocacy for inclusion of persons with disability in future stroke trials can improve equity in stroke care delivery. Further research evaluating the perspectives of key stakeholders including researchers, clinicians and patients on delivering acute

Keywords: Ethics, MRS, Clinical Trial Methodology, Acute Stroke, Endovascular Therapy

Financial Disclosures: The authors had no disclosures.

E-Poster 130

Evaluation and Management of Chronic Ischemic Penumbra

Alexander J Sweidan, MD¹, Wengui Yu, MD, PhD¹

¹University of California, Irvine - Department of Neurology, Orange, California, USA

Introduction:

Occlusion of middle cerebral artery (MCA) is typically of embolic origin (80%). Cellular viability but not function can be maintained if there is some degree flow, estimated between 8 to 23 mL/100g/min, this tissue is termed penumbra. If a substantive collateral system exists surrounding the infarcted core a chronic ischemic penumbra can exist. No major trials exist comparing medical management to revascularization.

Methods:

Herein we describe a case of a 50-year-old male with left sided numbness (NIHSS 2) found to have on non-contrast CT head a hypodensity in the right insular cortex. CT angiogram identified a proximal right MCA occlusion with extensive collateralization. CT perfusion identified a small area of decreased cerebral blood volume (CBV) but a large area of time to peak (TTP) prolongation indicative of a small ischemic core with a large penumbra. MRI brain confirmed the small acute infarct on diffusion weight imaging. Revascularization was not pursued due to quality of the collaterals. The etiology of the stroke was suspected to be intracranial arterial atherosclerosis given the collateralization. The patient 2 years later continues without any new symptoms, repeat serial CT perfusion show persistent mismatch of CBV and TTP.

Results:

As endovascular treatment (EVT) technique and technology improve, the boundaries of revascularization are pushed. We query if this patient would benefit from EVT? Medical management though excellent for secondary prevention will likely not resolve the chronic occlusion. This begets more questions: does the patient warrant blood pressure augmentation therapy to maintain perfusion across the collaterals? What would happen to this patient if they develop shock considering this chronic ischemic penumbra?

Conclusions:

Careful evaluation and follow up of patients with chronic ischemic penumbra are mandatory. To date, no trials exist comparing medical management versus revascularization. Further investigation is warranted.

Keywords: Angiographic Ct Perfusion, Collateral, Endovascular Therapy, Acute Ischemic Stroke Intervention, Revascularization

Financial Disclosures: The authors had no disclosures.

Infarction Patterns in Patients with Symptomatic Carotid Webs.

<u>SLEIMAN EL JAMAL, MD¹</u>, Raul G Nogueira, MD², Nirav Bhatt, MD², Catarina Tavares Festas Camara, MD³, Alhamza R Al-Bayati, MD², Song J Kim, MD², Marta Olivé Gadea, MD³, Michael Frankel, MD², Fadi Nahab, MD², Diogo C Haussen, MD²

¹RHODE ISLAND HOSPITAL GRADY MEMORIAL HOSPITAL, PROVIDENCE, Rhode Island, USA; ²Grady Memorial Hospital Emory University Hospital, Atlanta, Georgia, USA; ³Grady Memorial Hospital, Atlanta, Georgia, USA

Introduction:

Carotid webs (CaW) may explain strokes in young patients with cerebral embolism of otherwise undetermined cause. We aim to describe the radiological patterns of infarction in patients with symptomatic CaW.

Methods:

This was a retrospective analysis of local/comprehensive stroke center symptomatic CaW database (September 2014-July 2019). CT angiograms (CTA) were reviewed independently by two blinded raters. Symptomatic CaW was defined by a negative stroke work-up per best practice for embolic strokes of undetermined source(ESUS). Cases with >1 potential stroke etiology were excluded. Patterns of infarction included: territorial (involving ≥2 subdivisions), cortical affecting one subdivision, one/multiple small cortical infarcts(<1cm), borderzone infarcts(cortical or deep). Deep infarcts included lacunes (<1.5cm), or ≥1 deep vascular territory. Prior strokes and leukoaraiosis severity (modified Fazekas scale) were evaluated. The pattern of infarction was independently evaluated by two readers.

Results:

Fifty CaW patients were identified (86% strokes/14% TIAs). Median age was 50[IQR 41.5-59]years, 20% were male. 82% of the patients had cortical infarcts: 18% were territorial, 34% affected one subdivision, and 52% involved \geq 1 small cortical infarcts. Six percent of the infarcts were borderzone. 56% were deep infarcts, among which 21% were lacunar, while 79% involved more than one (deep) territory. Ten percent of patients had previous strokes (all in CaW territory) and 29% had some degree of leukoaraiosis (21% with grade 1 and 8% with grade 2). Median final infarct volume was 15.4cc(5.2-50.5). The interrater reliability for the final rating (on whether an infarction is cortical or not) among readers was perfect(k=1.00;p<0.001), while the one for deep infarcts was substantial(k=0.69;p<0.001;95%Cl0.49-0.87). The interrater reliability for prior strokes was moderate(k=0.43;p<0.003;95%Cl0.06-0.80); while for leukoaraiosis it was substantial(k=0.62;p<0.001,95%Cl0.40-0.83).

Conclusions:

CaW typically lead to cortical infarctions. Previous strokes were only found in the symptomatic CaW territory in a considerable proportion of patients, while leukoaraiosis was uncommon and typically mild.

Keywords: Acute Stroke, Carotid, Imaging, Cerebrovascular Disease, Stroke

Financial Disclosures: The authors had no disclosures.

E-Poster Only 132

Acute kidney injury after endovascular treatment in acute ischemic stroke patients

<u>Joonsang Yoo, MD¹</u>, Jeong-Ho Hong, MD², Seong-Joon Lee, MD³, Yong-Won Kim, MD⁴, Ji Man Hong, MD³, Chang-Hyun Kim, MD⁵, Jin Wook Choi, MD⁶, Dong-Hun Kang, MD⁷, Yong-Sun Kim, MD⁸, Yang-Ha Hwang, MD⁴, Jin Soo Lee, MD³, Sung-II Sohn, MD²

¹Department of Neurology, Keimyung University school of medicine, Daegu, Korea (Republic of); ²Department of Neurology, School of Medicine, Keimyung University, Daegu, Korea (Republic of); ³Department of Neurology, School of Medicine, Ajou University, Suwon, Korea (Republic of); ⁴Department of Neurology, School of Medicine, Kyungpook National University, Daegu, Korea (Republic of); ⁵Department of Neurosurgery, School of Medicine, Keimyung University, Daegu, Korea (Republic of); ⁶Department of Radiology, School of Medicine, Ajou University, Suwon, Korea (Republic of); ⁷Department of Radiology, School of Medicine, Ajou University, Suwon, Korea (Republic of); ⁸Department of Radiology, School of Medicine, Kyungpook National University, Daegu, Korea (Republic of); ⁸Department of Radiology, School of Medicine, Kyungpook National University, daegu, Korea (Republic of); ⁹Department of Radiology, School of Medicine, Kyungpook National University, daegu, Korea (Republic of);

Introduction:

Acute kidney injury (AKI) is associated with the use of contrast agents and is common in patients with ischemic stroke. However, research on AKI patients who have undergone endovascular treatment (EVT) is lacking. We evaluated the frequency of AKI and the factors associated with AKI after EVT.

Methods:

We retrospectively analyzed consecutively enrolled patients with acute ischemic stroke who underwent EVT within 24 hours of onset at three stroke centers in Korea from January 2011 to February 2016. AKI was defined in accordance with the Kidney Disease Improving Global Outcomes criteria. We compared the characteristics of patients with and without AKI and independent factors associated with AKI after EVT. We also investigated the effects of AKI on functional outcomes and mortality at 3 months.

Results:

Of the 558 patients analyzed, 61 (10.9%) developed AKI. Five patients (0.9%) started renal replacement therapy after admission. In the multivariate analysis, diabetes mellitus (odds ratio 2.185; 95% CI [1.201–3.972], P=0.010) and severe renal impairment (odds ratio 3.107; 95% CI [1.286–7.214], P=0.009), contrast dose (odds ratio 1.106 per 10 mL; 95% CI [1.032–1.184], P=0.004), and unsuccessful reperfusion (odds ratio 1.938; 95% CI [1.039–3.557], P=0.034) were independently associated with AKI after EVT. The presence of AKI was associated with poor functional outcome (odds ratio 3.740; 95% CI [1.671–9.185], P=0.002) and mortality (odds ratio 7.292; 95% CI [3.638–14.807], P<0.001) at 3 months.

Conclusions:

Diabetes mellitus, severe renal impairment, contrast dose, and unsuccessful reperfusion were independently associated with the development of AKI. AKI may also affect the outcome of ischemic stroke patients undergoing EVT. When implementing EVT, practitioners should be aware of these risk factors.

Keywords: Ischemic Stroke, Endovascular Therapy

Financial Disclosures: The authors had no disclosures.

Outcomes of Endovascular Therapy after Interhospital Transfer for Anterior Circulation Stroke <u>Aviraj Satish Deshmukh, Neurointervention Fellow</u>¹, Mohammed Alwadai, Neurointervention Fellow², Naif Alharbi, Neurointervention Fellow², Tushar Patil, NeuroICU fellow³, Amanda Martyniuk, Research Coordinator², Rhonda McNicoll-Whiteman, Clinical Nurse Specialist⁴, Mukul (Mike) Sharma, Associate Professor⁵, Brian Van Adel, Associate Professor²

¹McMaster University and Hamilton General Hospital, Hamilton, Canada; ²McMaster University, Hamilton, Canada; ³Emory University, Georgia, Canada; ⁴Hamilton Health Sciences, Hamilton, Canada; ⁵Population Health Research Institute, Hamilton, Canada

Introduction:

Endovascular Throbectomy (EVT) is performed at designated centers and necessitates transfer. The aim of this study is to describe the characteristics and outcomes of patients transferred from 15 feeding hospitals to a treating center.

Methods:

We retrospectively collected demographic, radiologic and outcome data on patients transferred for EVT from April 1st , 2016 to March 31st, 2019.

Results:

A total of 209 patients with were transferred to our RSC for potential EVT. A total of 140 (66.9%) patients were thrombolysed with IV-tPA prior to transfer. Patients were 70 (SD ± 13) years old and 52% were male. The median NIHSS score was 16 (IQR 12-21) with a M1 occlusion in 67.9%. EVT was performed in 71.2 %. The most common reason for non-treatment was vessel recanalization and/or clinical improvement in 31 patients (14.8%) followed by infarct progression in 17 patients (8.1%). Two patients suffered symptomatic ICH during transfer. Of those patients treated with EVT, successful recanalization (TICI 2b/3) was achieved in 114 (76.5%) patients with significant clinical improvement [Post EVT median NIHSS 7 (IQR 2.5-17)].

Conclusions:

Most patients transferred had successful recanalization but a substantial proportion were not treated. Determination of predictors of futile transfer will aid in targeting resources to those most likely to benefit.

Keywords: Acute Stroke, Endovascular Therapy, Aspects, Acute Ischemic Stroke Intervention

Financial Disclosures: The authors had no disclosures.

Quantification of Perfusion Defect Using National Institutes of Health Stroke Scale (NIHSS) Score Shashvat M Desai, MD¹, Santiago Ortega-Gutierrez, MD², Sunil A Sheth, MD³, Tudor G Jovin, MD⁴, Ashutosh P Jadhav, MD PhD¹

¹University of Pittsburgh, Pittsburgh, Pennsylvania, USA; ²University of Iowa Hospitals and Clinics, Iowa City, Iowa, USA; ³University of Texas Houston, Houston, Texas, USA; ⁴Cooper University, Camden, New Jersey, USA

Introduction:

Patient selection for thrombectomy of large vessel occlusion (LVO) strokes in the delayed window (>6 hours) is dependent on delineation of clinical-core or radiological mismatch using perfusion imaging. Selection paradigms not involving advanced imaging may reduce time to treatment and access in underdeveloped regions. We sought to explore the relationship between stroke severity (NIHSS score) and perfusion defect (Tmax >6 seconds).

Methods:

A retrospective analysis of anterior circulation LVO strokes at three large centers. Demographic (age, sex), clinical (NIHSS score), and radiological (CTP-Computed Tomography Perfusion processed using RAPID, IschemaView) information were analyzed. We performed exploratory analyses to define the relationship between stroke severity and perfusion defect, using NIHSS score subgroups and mean/median Tmax >6s volumes.

Results:

Of the 309 patients included, mean age was 69.5 \pm 14 and 54% were females. Median NIHSS score was 16 (12-20) and mean time to imaging was 6.7 \pm 6 hours. Mean ischemic core volume (CBF <30%) was 26 \pm 37 ml and penumbral volume (Tmax >6s) volume was 129.7 \pm 70 ml. Penumbral volumes by NIHSS subgroups have been tabulated. NIHSS-based predicted Tmax >6s (NIHSS-Tmax) was calculated as '*NIHSS X 5'*, using average of 25th percentile NIHSS in each group. NIHSS-Tmax volumes were less than or equal to actual Tmax >6s volume (did not over-estimate) in 75.1% (232) patients. Of 104 patients meeting DEFUSE-3 trial criteria, 87% patients were eligible for thrombectomy using NIHSS-Tmax volumes.

Tmax	NIHSS Groups								
>65 (ml)	0-5	6-10	11-15	16-20	21-25	>25			
Mean	88 ±69	121 ±71	126 ±61	136 ±74	134 ±67	151 ±72			
Median	71 (34- 121)	112 (76- 161)	118 (76- 169)	131 (81- 176)	126 (80- 173)	141 (100- 204)			

Conclusions:

Eighty-seven-percent of DEFUSE-3 eligible patients meet eligibility using perfusion defect quantified using NIHSS score [NIHSS X 5]. Perfusion defect quantification using NIHSS score may be a feasible alternative to perfusion imaging in resource and time limited environments.

Keywords: Acute Stroke, Cerebral Blood Flow, Endovascular Therapy, Imaging, Penumbra

Financial Disclosures: The authors had no disclosures.

E-Poster 135

Utility of tPA Administration in Acute Treatment of Carotid Artery Occlusions

<u>Keiko A Fukuda, MD¹</u>, Kavit Shah, MD¹, Daniel Tonetti, MD¹, Shashvat M Desai, MD¹, Bradley Gross, MD¹, Ashutosh P Jadhav, MD PhD¹

¹University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania, USA

Introduction:

Intravenous tissue plasminogen activator (IV-tPA) remains part of the guidelines for acute ischemic stroke treatment, yet internal carotid artery (ICA) occlusions are known to be poorly responsive to IV-tPA. It is still unknown whether bridging thrombolysis is beneficial in such cases. Our aim was to investigate the effect of IV-tPA in clinical outcomes in those treated for ICA occlusions.

Methods:

Data from 1367 consecutive stroke cases treated with endovascular thrombectomy (EVT) from 2012-2019 were prospectively collected from a single center. A total of 165 patients were found to have isolated, carotid terminus, and tandem ICA occlusions, who were treated within 4.5 hours of last seen well. Univariate and multivariate logistic regression were used to assess the relationship between tPA administration and clinical outcome.

Results:

Of 165 patients treated for ICA occlusions, 50% (n=82) received tPA. There were no differences between the groups with respect to age, NIHSS, time to treatment and ASPECTS score. Fifty-three percent (53%) had tandem ICA-MCA occlusions. Rate of recanalization (TICI2b) and symptomatic ICH did not significantly differ between the two groups. Regression analysis demonstrated no effect of tPA on modified Rankin Score (mRS) at 90 days and overall mortality. Factors significantly associated with reduced mortality included lower age, lower NIHSS, and better rate of recanalization.

Conclusions:

There was no significant difference in clinical outcomes in those receiving bridging thrombolysis vs. direct thrombectomy for carotid artery occlusions. For centers with optimal door-to-puncture times, bypassing IV-tPA may expedite recanalization times and potentially yield more favorable outcomes. Larger studies are warranted to further elucidate this question.

Keywords: Carotid, TPA, Acute Stroke, Acute Ischemic Stroke Intervention, Door To Groin Puncture

Financial Disclosures: The authors had no disclosures.
Radiological Features Associated with Unsuccessful Recanalization after Mechanical Thrombectomy in Large Vessel Occlusions

<u>Cynthia B Zevallos, MD</u>¹, Sudeepta Dandapat, MD¹, Andrea L Holcombe, PhD¹, Kiddy Ume, MD², Andres Dajles, MS¹, Darko Quispe, MD¹, Aldo Mendez, MD¹, Sameer Ansari, CNA¹, Edgar Samaniego, MD, MS¹, Fazeel Siddiqui, MD², Santiago Ortega-Gutierrez, MD, MSc¹

¹University of Iowa, Iowa City, Iowa, USA; ²Southern Illinois University, Springfield, Illinois, USA

Introduction:

Unsuccessful thrombectomy (UT) ranges between 8-18% in large vessel occlusion (LVO) stroke patients. Currently, there are no predictive models for reperfusion success or need of alternative approaches for challenging cases. We aimed to describe clinical and radiological features associated with UT.

Methods:

Consecutive, adult, thrombectomy patients (n=348) admitted to two comprehensive stroke centers were reviewed (2012-2017). Anterior circulation LVO patients were classified according to TICI score: unsuccessful (0-2A) and successful (2B-3) recanalization. Demographics and clinical data were obtained from medical records. Head CT, CT angiography (CTA) and digital subtraction angiography (DSA) images were reviewed. ASPECTS score, insular/temporal hypodensity, hyperdense artery sign measuring Hounsfield units (HU) in the occluded side and its counterpart, vessel calcification, M1/M2 caliber asymmetry comparing both sides, clot burden and collateral scores in CTA, vessel anatomy, occlusion site, collateral score, and type of occlusion in DSA were collected. Associations with UT were evaluated using Chi square, Wilcoxon Rank-Sum and logistic regression.

Results:

85 (25%) patients had UT. There were no significant differences in clinical features. Univariate analysis revealed the unsuccessful vs. successful groups differed respectively by smoking status (never: 48% vs. 61%, current: 29% vs. 27%, former: 22% vs. 12%, p=0.05), delta HU \leq 5 (47% vs. 35%, p=0.04), angio collateral score of 4-5 (34% vs. 11%, p=0.001), and caliber asymmetry (40% vs. 27%, p=0.02), truncal occlusion (41% vs. 26.4%, p=0.013), vessel tortuosity (21% vs. 8%, p=0.004) and difficult arch (14% vs. 4%, p=0.002) present on DSA. In a multivariable model, current smokers (OR=2.6, 95% CI 1.36, 4.99), HU \leq 5 (OR=2.16, 95% CI 1.23, 3.79), and presence of truncal occlusion (OR=2.13, 95% CI 1.21, 3.74), tortuosity (OR=2.36, 95% CI 1.08, 5.15) and difficult arch (OR=4.79, 95% CI 1.54, 14.95) were significantly associated with risk of UT.

Conclusions:

Identification of radiological predictors on CT/CTA may help identify refractory patients with standard thrombectomy strategies.

Keywords: Acute Ischemic Stroke Intervention, Acute Stroke, Cerebrovascular Disease, Imaging, Recanalization

Financial Disclosures: The authors had no disclosures.

Single center experience for Solitaire and Trevo stents in endovascular treatment of acute ischemic stroke

Jung Hwa Seo, Assistant professor¹, Hae Woong Jeong, Professor²

¹Neurology, Busan Paik Hospital, Inje University College of Medicine, Busan, Korea (Republic of); ²Diagnostic Radiology, Busan Paik Hospital, Inje University College of Medicine, Busan, Korea (Republic of)

Introduction:

Limited data are available on the comparison of the effectiveness of Solitaire and Trevo stentrievers in endovascular thrombectomy for achieving recanalization and improving functional outcome in patients with acute ischemic stroke. We aimed to compare the safety and efficacy of the two stents during endovascular thrombectomy in patients with acute ischemic stroke.

Methods:

This study included 130 patients who underwent endovascular thrombectomy using either the Trevo (n=51) or Solitaire (n=79) stent for anterior circulation acute ischemic stroke. Recanalization was classified using TICI grading. Efficacy and safety of the devices during endovascular thrombectomy were analyzed by evaluating the rate of good recanalization after the first pass, clot retrieval rate, final recanalization grade, use of rescue treatment, recanalization time, and hemorrhagic and thromboembolic complications.

Results:

Overall, good recanalization (TICI 2b and 3) was achieved (Solitaire: n=57, 72.2%; Trevo: n=46, 90.2%) (P=0.01). The rate of good recanalization after the first pass and clot retrieval rate were similar between groups; however, use of rescue treatment was more frequent in the Solitaire group. Recanalization time was shorter in the Trevo group. The good clinical outcome rate was higher in the Trevo group, but not statistically. The rates of symptomatic hemorrhage and thromboembolism were not significantly different between groups.

Conclusions:

Our study showed that Trevo stent had the advantages of achieving more successful recanalization, with less use of rescue treatment, and taking less time for recanalization than Solitaire stent. However, there is no statistically significant difference in the clinical outcome. We think that Trevo stent in EVT for AIS is a device with some merit compared to Solitaire stent.

Keywords: Endovascular Therapy, Stroke, Stentretriever

Financial Disclosures: The authors had no disclosures.

Rates of Endovascular Thrombectomy Utilization In a Transfer Cohort Within a Tele-Stroke Network <u>Sujan T Reddy, MD¹, Elliott Friedman, MD¹, Tzu-Ching Wu, MD¹, Octavio Arevalo, MD¹, David</u> Rosenabum, MD², Sean I Savitz, MD¹

¹University of Texas Health Science Center at Houston, Houston, Texas, USA; ²University of Texas Health Science Center, Houston, Texas, USA

Introduction:

Implementation of tele-stroke model has resulted in increased transfers from referring hospitals (RH) to comprehensive stroke centers (CSC) for potential endovascular thrombectomy (EVT) evaluation of patients suspected of having anterior circulation large vessel occlusion (ACLVO). We assessed the rates of EVT utilization in the transfer cohort and identified reasons for exclusion from thrombectomy.

Methods:

We retrospectively analyzed patients with suspected ACLVO transferred for potential EVT from a RH to our CSC within our tele-stroke network, between September 2015 and September 2018. Patients were stratified into two groups, EVT and medical management (MM) only. We enumerated reasons for exclusion from EVT.

Results:

A total of 220 patients were analyzed, of which 118 (54%) were males, median age 67 (IQR 55-77) years and median NIHSS 15 (IQR 8-21). EVT on arrival was performed in 68 (31%) patients and 152 (69%) were medically managed only. IV-tPA at RH was administered to 47 (69%) patients in the EVT group and 112 (74%) patients in the MM only group (P=0.5). Baseline variables were similar between the two groups. Absence of LVO on arrival on CT angiogram [63 (41%)] was the major reason for exclusion from EVT. IVtPA was administered to 52 (83%) of these patients. Other reasons identified were distal occlusion (M2, M3) [34 (22%)], low CT ASPECTS (<6) [33 (22%)], low NIHSS (<6) [5 (3%)], outside EVT window (6 hours) [4 (3%)], and other [13 (9%)].

Conclusions:

A significant number of patients transferred from RH to CSC do not undergo EVT on arrival due to absence of LVO. While it is possible some of the transferred patients re-canalized spontaneously or after thrombolysis, instituting vascular imaging at the RH prior to transfer can help reduce many futile transfers.

Keywords: Acute Ischemic Stroke Intervention, Endovascular Therapy, Recanalization, Angiographic Ct, MCA

Financial Disclosures: The authors had no disclosures.

Troponin Elevation in Mechanical Thrombectomy Patients with Acute Stroke is Not Associated with Worse Outcomes

<u>Melissa Bailey, MD</u>¹, Vasu Saini, MD¹, Juan Sebastian Diaz, MD¹, Sishir Mannava, MD¹, Elizabeth Jordan, BS¹, Nastajjia Krementz, MD¹, Mario Zamora, MD¹, Luis Guada, MD¹, Dileep Yavagal, MD¹, Nicole Sur, MD¹

¹University of Miami/Jackson Memorial Hospital, Miami, Florida, USA

Introduction:

Elevated troponin levels during an acute ischemic stroke have been associated with atrial fibrillation, increased National Institutes of Health Stroke Scale (NIHSS) score, embolic stroke, and recently more specifically with cardioembolic stroke. The aim of the current study was to describe troponin levels in patients with large vessel occlusion who underwent mechanical thrombectomy (MT) and associated outcomes.

Methods:

Data was abstracted from our single center retrospective database that includes 348 patients with ischemic stroke who underwent MT between Feb 2015 and Sept 2018. Troponin levels >0.034 were defined as elevated. A modified Rankin Scale (mRS) score of 0-3 on discharge was defined as a good outcome. Data analysis was done by using chi square and logistic regression models adjusting for confounders including demographics, NIHSS score, thrombolysis in cerebral infarction (TICI) score, and clinical characteristics.

Results:

A total of 204 (59%) patients had admission troponin levels and 109 (31%) patients had peak troponin levels reported during the study. The mean age was 71+14 years, the mean initial NIHSS was 16+8.97, and 53% of patients were identified as having a cardioembolic source of stroke. Troponin on admission was elevated in 99 (49%) patients and peak troponin was elevated in 76 (70%) patients. The mean admission troponin was 0.46+62.90 and mean peak troponin was 1.77+6.30. On univariate regression, admission troponin values <0.034 were associated with better odds of a good outcome (p=0.03, OR 3.09, Cl 1.10-8.70), but on multivariate regression this was not significant. Elevated troponins were significantly associated with acute kidney injury (p=0.02, OR 9.25, Cl 1.53-55.74).

Conclusions:

In our study, patients with acute ischemic stroke who underwent MT and had elevated troponin levels at admission were more likely to have acute kidney injury; however, there was no difference in functional outcomes at discharge.

Keywords: Mechanical Thrombectomy, Endovascular, Acute Stroke, Ischemic Stroke, Cerebrovascular Disease

Financial Disclosures: The authors had no disclosures.

Lower LDL is Not Associated With Increased Risk of Hemorrhagic Conversion after Mechanical Thrombectomy

Daniel R Kogan, MD, MS¹, Vasu Saini, MD¹, Elizabeth A Jordan, BS¹, Melissa Bailey, MD¹, Sishir Mannava, MD¹, Nastajjia Kremetz, MD¹, Juan Sebastian Diaz, MD¹, Mario Zamora, MD¹, Luis Guada-Delgado, MD¹, Amer M Malik, MD¹, Dileep R Yavagal, MD¹, Nicole B Sur, MD¹

¹University of Miami / Jackson Memorial Hospital, Miami, Florida, USA

Introduction:

Recent retrospective and prospective studies have argued for a protective effect of higher low-density lipoprotein concentrations (LDL-C) in anterior circulation ischemic stroke patients after mechanical thrombectomy (MT) and in risk of intracranial hemorrhage in a healthy population. Our study further examines the association between LDL-C and hemorrhagic conversion (HC) in acute ischemic stroke patients who have undergone MT.

Methods:

A retrospective observational study of 348 patients undergoing MT from February 2015 to July 2018 was conducted at a large comprehensive stroke center. Serum LDL-C concentrations were assessed on admission for acute ischemic stroke. Incident HC was confirmed by review of medical records for that hospitalization period. Univariate and multivariate regression models were used and outcomes were adjusted for demographics, baseline characteristics and peri-procedural and systemic complications.

Results:

A total of 336/348 patients undergoing MT had LDL-C values reported. Mean age was 71±14 (50% female, 24% African American, 42% Hispanic, 32% history of hyperlipidemia). Mean LDL-C was 85±40, median baseline modified Rankin Scale score (mRS) of 0 [IQR 0 -1], and mean admission NIHSS of 16 [IQR 11-20]. There was no statistically significant difference in odds of HC or significant intracranial hemorrhage (sICH) among participants with LDL concentrations of <70 mg/dL compared with LDL-C concentrations ≥70 mg/dL, OR 0.86 [CI 0.54-1.38]. Similarly the odds of significant functional disability (mRS >3) at discharge was not significantly affected by LDL-C concentration, OR 0.81 [CI 0.51-1.27].

Conclusions:

We did not observe a significant association between lower LDL-C and higher risk of HC, sICH or discharge mRS in acute ischemic stroke patients who have undergone mechanical thrombectomy.

Keywords: Mechanical Thrombectomy, Acute Ischemic Stroke Intervention, Endovascular Therapy, Hemorrhagic Transformation, Neuroprotection

Financial Disclosures: The authors had no disclosures.

Factors Associated with Prolonged Hospitalization in Stroke Patients after Endovascular Treatment <u>Nastajjia A Krementz, MD¹</u>, Vasu Saini, MD¹, Sishir Mannava, MD¹, Melissa Bailey, MD¹, Luis Guada, MD¹, Elizabeth Jordan, BS¹, Sebastian Diaz, MD¹, Mario Zamora, MD¹, Daniel Kogan, MD¹, Nicole B Sur, MD¹, Dileep R Yavagal, MD¹

¹University of Miami, Department of Neurology, Miami, Florida, USA

Introduction:

Prolonged hospitalization has an inverse relationship with functional outcome in patients with acute stroke, but data is lacking on patients with large vessel occlusion (LVO) who undergo endovascular treatment (EVT). The purpose of this study was to investigate factors related to prolonged hospitalization in patients post EVT.

Methods:

EVT patients were identified from a prospectively collected stroke database maintained at our institution. We collected demographics, comorbidities, hospital and intensive care unit (ICU) length of stay. We recorded any medical complications during their hospitalization and performed a multivariate regression analysis to identify factors predicting prolonged hospitalization.

Results:

From February 2015 to September 2018, 348 patients underwent EVT at our institution. Median age was 71 (IQR 22) and 47.4% were women. Modified Rankin Scale (mRS) at baseline was 0 (IQR1), median admission and post EVT NIHSS was16 (IQR 9) and 12 (IQR 15), respectively. Median hospital length of stay was 8 days (range 0.6 to 109) and ICU length of stay of 2 days (range 0 to 58). Univariate analysis showed patients with prolonged hospitalization had poor functional outcomes at discharge (mRS 4-6, p<0.001). Multivariate analysis showed tracheostomy (p=0.022), feeding tube placement (p<0.001), dialysis (p<0.001), urinary tract infection (p<0.001), higher NIHSS on admission (p=0.021), and increased number of passes needed for reperfusion (p=0.036) were positive predictors of prolonged hospitalization. There was a trend towards significance among patients who did not receive IV tPA (p=0.08) and those requiring hemicraniectomy (p=0.096).

Conclusions:

Prolonged hospitalization is a predictor of poor functional outcome for EVT patients at discharge. Higher NIHSS on admission, tracheostomy, feeding tube placement, dialysis, urinary tract infection and increased number of passes to obtain reperfusion are positive predictors of prolonged hospitalization. Not being given IV tPA and undergoing hemicraniectomy near significance as independent predictors. This can be further validated with large registries of EVT patients.

Keywords: Acute Ischemic Stroke Intervention, Mechanical Thrombectomy, Ischemic Stroke

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS—E-Poster ONLY

E-Poster 142

Iron Deficiency Anemia and Pedunculated Carotid Artery Thrombus

Jay Dolia, MD¹, Raul G Nogueira, MD¹, Melanie Winningham, MD², Mahmoud Mohammaden, MD¹, Michael Frankel, MD¹, Fadi Nahab, MD³, Diogo C Haussen, MD¹

¹Grady Memorial Hospital/Emory University Hospital, Atlanta, Georgia, USA; ²Sentara Healthcare, Charlottesville, Virginia, USA; ³Emory University Hospital, Atlanta, Georgia, USA

Introduction:

Iron deficiency anemia(IDA) is an under recognized hematologic condition associated with increased thrombotic tendencies that can result in formation of pedunculated carotid artery bulb thrombus(CAT). Currently, there are no guidelines to determine optimal management of these patients with concomitant CAT and IDA. We seek to report clinical and imaging findings of patients with this condition.

Methods:

We analyzed all acute ischemic stroke patients with pedunculated carotid thrombusassociation with iron deficiency anemia that presented to a large volume comprehensivestroke center between 07/01/2014-04/18/2019. Inclusion criteria: diagnosis of free-floatingcarotid bulb thrombus by CT angiography (CTA) of the neck with repeat CTA confirming clotresolution and normal underlying internal carotid anatomy or with pathology confirming lackof underlying disease state.

Results:

Ten patients were identified with concurrent objective evidence of CAT and iron deficient state (MCV 71.21±7.51,Hb 9.4±3.22, HCt 30.1±8.9, MCHC 30.9±2.2). Average age 46±13years with female predominance (70%). The most common cause for anemia at the time of presentation was abnormal uterine bleeding (40% of patients). All patients lacked conventional stroke risk factors: A1c 5.24±0.45, LDL 81.5±18.6, Platelets 449.1±208.3 (5 patients with >500,000 platelets and 5 with normal platelet count). None of the patients received thrombolysis due to late presentation. IDA and CAT was observed with unilateral pedunculated clots; however, one patient presented with bilateral CAT. A third of patients underwent mechanical thrombectomy (all to retrieve associated intracranial occlusions). A third was treated with anticoagulation while the other 2/3 received antiplatelet therapy.

Conclusions:

Repeat vascular imaging is needed to rule out underlying structural causes for CAT, such asatherosclerosis or carotid webs. CAT may be a result of a hypercoagulable state induced byIDA in conjunction with turbulent flow in the carotid bulb. Further studies are needed.

Keywords: Acute Stroke, Cerebrovascular Disease, Carotid, Thrombosis, Treatment

Financial Disclosures: The authors had no disclosures.

RESEARCH ABSTRACTS—E-Poster ONLY: PRIMARY CATEGORY – ISCHEMIC STROKE

E-Poster 143

Presence of Collateral Flow Impacts Assessment of Large Vessel Occlusion.

<u>Amber Y Dorn, B.A.</u>¹, Tomohide Yoshie, M.D., Ph.D.², Samuel G Thorpe, Ph.D.¹, Kian Jalaleddini, Ph.D.¹, Corey M Thibeault, Ph.D.¹, Fabien Scalzo, Ph.D.³, Seth J Wilk, Ph.D.¹, Ruchir Shah, M.D.⁴, Thomas G Devlin, M.D., Ph.D.⁴, Robert B Hamilton, Ph.D.¹

¹Neural Analytics, Inc., Los Angeles, California, USA; ²St. Marianna University Tokyo, Kawasaki, Japan; ³University of California Los Angeles, Los Angeles, California, USA; ⁴Erlanger Neuroscience Institute, Chattanooga, Tennessee, USA

Introduction:

For the non-invasive assessment of LVO, clinical evaluation (eg. NIHSS), available imaging modalities (eg, NCCT ASPECTS), and hemodynamic monitoring (eg. TCD) are relied upon for treatment decision. Previous work has shown no significant correlation between ASPECTS and TCD Velocity Curvature Index (VCI). Here we investigate the influence of collateral flow on these critical diagnostic modalities.

Methods:

Standard of care and TCD exams were collected from subjects with acute LVO enrolled consecutively at a regional stroke center. VCI was computed retrospectively from TCD recordings of the left/right MCA. Collateral flow was retrospectively scored on a scale of 1-5 using CTA source images, and used to separate subjects into two groups corresponding to low (1 or 2) and good (3 or greater) collateral flow. Differences in NIHSS, ASPECTS, and VCI between these groups were assessed using the Mann-Whitney U test.

Results:

NIHSS scores were significantly higher (U=46.5, p<0.01) for subjects with low collateral flow (mean=19.1) relative to high (mean=12). Mean VCI was lower for low collateral subjects (mean=2.52) relative to high (mean=3.08), though the differences in VCI did not reach significance (U=62, p=.057). Similarly, mean ASPECTS score was lower for subjects with low collateral flow (mean=5.67) relative to high (mean=6.9), but the differences were not statistically significant between groups (U=82, p=.17).

Conclusions:

Our results suggest these metrics are impacted to varying degrees by collateral flow, with NIHSS being the most affected. The near-significant trend observed for VCI, along with the fact that the high collateral group mean observed for ASPECTS was so close to the clinical threshold, illustrates the potential for diagnostic decisions to be confounded by collateral flow.

Keywords: Transcranial Doppler, Stroke, Collateral, Ct Perfusion

Financial Disclosures: Author is a paid employee of Neural Analytics, Inc. and holds either stock or stock options in the company.

Utilization Of IV-rtPA And Endovascular Therapy Use On Off-hours Vs. On-hours: An Age Group Comparison

<u>Smit Patel, MD¹</u>, Neel Patel, MBBS², Vasu Saini, MD³, Mubashir Pervez, MD¹, Fadar Oliver Otite, MD⁴, Negar Asdaghi, MD³, Priyank Khandelwal, MD⁵

¹Hartford Hospital, Hartford, Connecticut, USA; ²UT Houston Health center, Houston, Texas, USA; ³University of Miami, Miami, Florida, USA; ⁴Upstate Medical University, Syracuse, New York, USA; ⁵Rutgers New Jersey Medical School, New Jersey, New Jersey, USA

Introduction:

Previous studies have yielded inconsistent results on whether weekend admission impacts utilization of EVT and IV-rtPA. There is limited data available of whether age groups difference affects on use of IV-rtPA and EVT admitted during the off-hours. Our study aimed to investigate whether admission during the off hours has any effect on the EVT & IV-rtPA utilization and is distributed uniformly across all age groups?

Methods:

All adults admitted to US hospitals from 2005-2015 with a primary diagnosis AIS (n=4,520,516) were identified from the Nationwide Inpatient Sample using ICD-9 CM codes. Discharge weights were used to generate national estimates. On-hours vs. off-hours were defined using the weekend variable. Age groups were divided into 18-39, 40-59, 60-79 and ≥80 years. An age groupwise multivariable logistic regression models were used to compare odds of EVT and IV-rtPA use between on-hours vs. off-hours.

Results:

Total 4.5 million AIS population comprised 2.1% of 18-39 years, 20.0% of 40-59 years, 44.1% of 60-79 years and 34.0% of \geq 80 years. Off-hours admissions comprised 25.7% of total AIS. After a multivariable adjustment of patients and hospital characteristics, odds of EVT utilization was 0.85 (P=0.18) in 18-39 years, 0.92 (P=0.13) in 40-59 years, 0.91 (P=0.014) in 60-79 years and 0.84 (P=0.003) in \geq 80 years. While in IV-tPA group, odds of IV-tPA use was 1.09 (P=0.16) in 18-39 years, 1.08 (P=0.001) in 40-59 years, 1.09 (P <0.0001) in 60-79 years and 1.07 (P=0.002) in \geq 80 years.

Conclusions:

Our study concludes that there is a lower rate of EVT performed during off-hours in the age groups of 60-79 and \geq 80 years old. However, there was no difference reported in the use of EVT in the younger population. It's also interesting to note that there is a higher use of IV-rtPA during the off-hours in all age groups except age group 18-39 years.

Keywords: Mechanical Thrombectomy, Neurointerventional Education, Endovascular Therapy, Acute Stroke

Financial Disclosures: The authors had no disclosures.

Association of cholesterol levels in a female acute ischemic stroke population

<u>Leanne E Brechtel, Medical Student</u>¹, Teodora Stoikov, Medical Student¹, Nicolas Poupore, Medical Student¹, Thomas Nathaniel, PhD²

¹University of South Carolina School of Medicine Greenville Prisma Health, Greenville, South Carolina, USA; ²University of South Carolina School of Medicine Greenville, Greenville, South Carolina, USA

Introduction:

In studying stoke, it has been reported that women have a higher overall stroke mortality rate and have less favorable outcomes in the rehabilitation period than men. An understanding of the clinical risk factors and comorbid conditions specific to women may help elucidate an explanation for the discrepancy regarding gender and stroke outcome. Our study aims to analyze and define clinical risk factors that are significantly influenced by being female, stratifying the population with regards to cholesterol level.

Methods:

In a stroke population of patients taken from a stroke registry, demographics and clinical factors were compared. The population was divided by gender and stratified based on their cholesterol level on presentation. A multivariable binary logistic regression was used to analyze clinical and demographic factors.

Results:

3,532 patients presented with normal total cholesterol, 760 patients with borderline high total cholesterol and 427 patients with high total cholesterol. The high total cholesterol group was more likely to be female and had a higher BMI. Isolating the female population, in the high total cholesterol group, females were older, had higher rates of atrial fibrillation, depression, and history of previous TIA. Multivariate analysis was used for the group with a high total cholesterol and after adjusting for confounding factors, increasing age, BMI, and higher HDL were more likely to be associated with being female.

Conclusions:

Understanding the factors that impact a female stroke population is vital to working to promote change that can result in better outcomes for patients. We determined that female gender was more likely to be associated with higher cholesterol and a higher BMI, known risk factors for stroke. Using cholesterol levels specifically, a known risk factor for stroke, we described the additional factors that were unique to the female population in our cohort.

Keywords: Acute Stroke, Ischemic Stroke

Financial Disclosures: The authors had no disclosures.

RESEARCH ABSTRACTS—E-Poster ONLY

E-Poster 146

Predicting Improvement in Ischemic Stroke Patients with Previous Transient Ischemic Attack >24 Hours of Onset

Dan Strat, Mr.¹, Nic Poupore, Mr.¹, Tristan Mackey, Mr.¹, Thomas Nathaniel, Dr., PhD¹

¹University of South Carolina School of Medicine Greenville, Greenville, South Carolina, USA

Introduction:

Clinical problems associated with recombinant tissue plasminogen activator (rt-PA) after transient ischemic attack (TIA) within 24 hours preceding acute ischemic stroke (AIS) is well documented in the literature. The aim of the current study was to assess the impact of TIA greater than 24 hours preceding acute ischemic stroke on the safety and efficacy of rt-PA by predicting functional outcomes.

Methods:

Data from a regional stroke registry with ischemic stroke patients with previous TIA greater than 24 hours was collected. We analyzed clinical and demographic data of 7000 patients with AIS who were consecutively treated with rt-PA. An improvement score was calculated and assigned to each patient based on standardized ambulation status at admission and at discharge. Univariate analyses determined significant clinical factors of rt-PA administration patients associated with improvement. A backwards-stepwise regression was conducted, using the univariate-significant clinical factors as variables, to model factors that predict improvement in rt-PA administration.

Results:

Our regression model predicted that female ischemic stroke patients (odds ratio(OR) = 1.916, confidence interval (CI) = 0.950-3.863, P = 0.069) that presents with a history of previous stroke (OR = 2.888, CI = 1.373-6.073, P = 0.005) are more likely to be associated with an improvement in ambulation following rt-PA. For patients that did not receive rt-PA, the following factors were associated with improvement: being male (OR = 0.650 (OR<1 signifies being male), CI = 0.391-1.079, P = 0.095), having had a previous stroke (OR = 1.528 (OR>1 signifies positive for previous stroke), CI = 0.929-2.512, P = 0.095), and not having HbA1c checked (OR = 0.457 (OR<1 signifies not having HbA1c checked), CI = 0.203-1.031, P = 0.059).

Conclusions:

TIA greater than 24 hours prior to ischemic stroke can influence functional outcome in acute ischemic stroke patients qualified for thrombolytic therapy.

Keywords: Acute Ischemic Stroke Intervention, TIA, TPA, Ischemic Stroke

Financial Disclosures: The authors had no disclosures.

RESEARCH ABSTRACTS—E-Poster ONLY

E-Poster 147

Gender and Previous TIA in Acute Ischemic Stroke Population

Dan Strat, Mr.¹, Nic Poupore, Mr.¹, Tristan Mackey, Mr.¹, Thomas Nathaniel, Dr., PhD¹

¹University of South Carolina School of Medicine Greenville, Greenville, South Carolina, USA

Introduction:

This study investigates the clinical risk factors associated with inclusion for recombinant tissue plasminogen activator (rtPA) administration among ischemic stroke patients with previous TIA greater than 24 hours by gender.

Methods:

We retrospectively analyzed the clinical and demographic data of patients with acute ischemic stroke with TIA greater than 24 hours to determine inclusion or exclusion from thrombolytic therapy by gender. Univariate analyses were conducted to determine significant clinical factors associated rtPA administration in males and females. Using the univariate-significant factors as variables, backwards-stepwise logistic regressionanalyses were performed to predict rtPA administration for each gender.

Results:

In the male ischemic stroke population, our regression model predicted that patients with depression (OR = 4.131, CI = 1.468-11.628, P = 0.007) and a history of smoking (OR = 4.586, CI = 2.051-10.251, P < 0.001) are more likely to be included for thrombolytic therapy, whereas patients with international normalized ratio (INR) (OR = 0.159, CI = 0.029-0.860, P = 0.033) are more likely to be excluded for thrombolytic therapy. Female patients with NIH stroke score (OR = 1.088, CI = 1.043-1.134, P < 0.001) and migraines upon presentation (OR = 7.605, CI = 1.455-39.742, P = 0.016) are more likely to be included for thrombolytic therapy, while females with international normalized ratio (OR = 0.026, CI = 0.001-0.875, P = 0.042) and tachycardia (OR = 0.977, CI = 0.957-0.998, P = 0.034) are associated with exclusion.

Conclusions:

This study reveals that more clinical risk factors are associated with the likelihood of excluding more female ischemic stroke patients with TIA more than 24 hours preceding ischemic stroke.

Keywords: Ischemic And Hemorrhagic Stroke, TIA, TPA, Ischemic Stroke

Financial Disclosures: The authors had no disclosures.

Pilot study discriminating between LVO and distal occlusion based on TCD waveform analysis <u>Corey M Thibeault, PhD¹</u>, Kian Jalaleddini, PhD¹, Samuel G Thorpe, PhD¹, Nicolas Canac, PhD¹, Amber Y Dorn, BS¹, Seth J Wilk, PhD¹, Ruchir Shah, MD², Thomas G Devlin, MD, PhD², Robert B Hamilton, PhD¹

¹Neural Analytics, Inc., Los Angeles, California, USA; ²Erlanger Neuroscience Institute, Chattanooga, Tennessee, USA

Introduction:

Traditional transcranial Doppler (TCD) ultrasound metrics in the acute phase of large-vessel occlusion (LVO) diagnosis have been shown to provide complementary value to current standard-of-care triage modalities. In addition to these metrics, pulse-level morphological features have also begun to show diagnostic utility. This pilot study explores Velocity Curvature Index (VCI), one such morphological feature. VCI is an application of curvature, which quantifies the degree to which a beat morphologically deviates from normal. This reduces the dimensionality of a pulse, and has shown discriminatory power when comparing LVO subjects (ICA, M1, M2, MCA segments) to controls. This study extends beyond that binary case to explore how VCI changes in subjects with distal occlusions (M3, M4, MCA segments, and lacunar).

Methods:

The three cohorts were confirmed by CTA imaging and were comprised of LVO (n=36, 70±20.4 years, 52% male), Distal occlusion (n=7, 67±14.6 years, 77% male), and Controls (n=35, 57±16.5 years, 61% male). In addition to standard imaging, bilateral TCD measurements of the middle cerebral artery were collected. TCD waveforms were sampled at 30-s intervals and further processed by extracting the corresponding beats and resulting VCI for each subject.

Results:

A one-way ANOVA revealed a significant effect of cohort on VCI [F(2, 75) = 41.76, p<0.001]. Post-hoc analysis using Bonferroni correction, found significant differences between LVO (2.83 ±0.92) and Controls (5.09±1.14) [p<0.001], Distal (3.97±1.13) and controls [p<0.05], as well as Distal and LVO [p<0.05] groups.

Conclusions:

In this case the distal occlusion group had VCI values between the LVO and control groups -- supporting VCI as a continuous estimate of vascular dysfunction. Furthermore, the extension beyond binary discrimination illustrates the use of VCI as a complementary measure of ischemic stroke severity.

Keywords: TCD, Transcranial Doppler, Cerebral Blood Flow, MCA, Stroke

Financial Disclosures: C. Thibeault is an employee of Neural Analytics, Inc. and owns stock and stock options in Neural Analytics, Inc.

Grant Support: This work was supported by the National Institute Of Neurological Disorders And Stroke of the National Institutes of Health under award 1R43NS105340-01. The NIH had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; preparation, review, or approval of the abstract; and decision to submit the abstract for publication. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Intra-arterial Thrombolysis after Failed Mechanical Thrombectomy: A STRATIS Registry Subgroup Analysis

<u>Syed Zaidi, MD¹</u>, Alicia C Castonguay, PhD¹, Mouhammad A Jumaa, MD¹, Hisham Salahuddin, MD¹, Nils Mueller-Kronast, MD², Osama Zaidat, MD, MS³

¹University of Toledo, Toledo, Ohio, USA; ²Delray Medical Center, Delray Beach, USA; ³Mercy St. Vincent Medical Center, Toledo, Ohio, USA

Introduction:

Limited prospective data exists on the use of intra-arterial (IA) thrombolytics as rescue therapy (RT) after failed mechanical thrombectomy (MT) in acute ischemic stroke (AIS) patients with large vessel occlusions (LVO). The aim of this study is to investigate the use of IA recombinant tissue plasminogen activator (IA-rtPA) as RT in the STRATIS Registry.

Methods:

Data from the STRATIS Registry were analyzed. Clinical and angiographic outcomes were compared between patients treated with and without IA-rtPA. Both anterior and posterior circulation occlusions were included in this substudy.

Results:

Of the 938 STRATIS patients, 809 and 129 were in the no IA-rtPA and IA-rtPA groups, respectively. No difference was seen in baseline demographics, with the exception of pre-stroke modified Rankin Scale (mRS) score, which was significantly lower in the IA-rtPA group. Site of occlusion was similar between the groups, with the majority occurring in the MCA. IV-rtPA was administered in 63.0% and 70.5% of no IA-rtPA and IA-rtPA patients (p=0.11). Median IA-rtPA dose was 4mg (IQR 2-12). Mean onset to arterial puncture time was shorter in the IA-rtPA group (200.2±104.6 versus 228.2±98.5 minutes, p=0.003); however, mean puncture to procedure end time was longer in the IA-rtPA group (78.7±43.1 versus 63.1±35.9 minutes). Mean number of passes (2.2±1.4 versus 1.8±, p=0.001) and rate of distal embolization (67.8% versus 54.5%, p=0.007) was significantly higher in the IA-rtPA group. Core lab adjudicated substantial reperfusion (mTICl≥2b) was achieved in 88.4% and 84.7% of no IA-rtPA and IA-rtPA patients (p=0.16). No difference was observed in rates of symptomatic intracranial hemorrhage (sICH) (p=0.70), good functional outcome (p=0.86), or mortality (0.80) at 90-days.

Conclusions:

Use of IA-rtPA after failed thrombectomy was not associated with an increased risk of sICH or mortality in the STRATIS Registry. These results suggest that IA thrombolysis may be a safe option as rescue therapy in select patients.

Keywords: Intra-Arterial Therapy, Endovascular Therapy, Thrombolytics, Lytics, TPA

Financial Disclosures: The authors had no disclosures.

Grant Support: No support was provided for this substudy. Medtronic is the sponsor of the STRATIS Registry.

Insights into Intra-arterial Thrombolysis in the Modern Era of Mechanical Thrombectomy <u>Alicia C Castonguay, PhD</u>¹, Mouhammad A Jumaa, MD¹, Osama O Zaidat, MD, MS², Diogo Haussen, MD³, Ashutosh Jadhav, MD⁴, Syed Zaidi, MD¹

¹University of Toledo, Toledo, USA; ²Mercy St. Vincent Medical Center, Toledo, USA; ³Emory University School of Medicine, Atlanta, USA; ⁴University of Pittsburgh Medical Center, Pittsburgh, USA

Introduction:

The role of intra-arterial(IA) thrombolysis in modern endovascular therapy is not well understood and limited data exists on its current use in real-world practice. Here, we surveyed neurointerventionalists to evaluate their current clinical practices and opinions of IA thrombolysis in the new era of MT.

Methods:

A 24-question anonymous survey was distributed via email to the members of the Society of Vascular and Interventional Neurology.

Results:

104 responses were included in the analysis. Most respondents were interventional neurologists (76.9%) and had ≥5-years in neuro-interventional practice (80.8%). IA thrombolytics are presently used by 60.6%, of which 47.7% treated 1-5 cases per year with IA recombinant tissue plasminogen activator(rtPA). Aspiration plus stent-retriever was the most common mechanical thrombectomy (MT) approach used with IA thrombolysis (66.0%). IA Thrombolysis was used in mainly three approaches: 1) treatment of primary distal occlusions, 2) as rescue after proximal occlusion thrombectomy, and 3) or as adjunct therapy to primary MT approach. 60.4% used IA thrombolytics in all these three methods. The most frequent IA-rtPA dose was 3-10mg, with 1mg/min infusion rate (56.6%). 84.9% do not have a standardized protocol for administering IA-rtPA. About half (50.9%) believed there should be no time limit for administering IA lytic if there is a favorable imaging profile, while 30.2% indicated ≤6 hours. Most respondents (76.5%) would consider using IA-tenecteplase in a trial setting. Only 12.9% felt there was no role for IA thrombolysis in modern endovascular practice. Respondents with ≥10-years' experience were less supportive of the future of IA lytic (98.0% versus 76.4%,p=0.006).

Conclusions:

IA thrombolysis is currently used in clinical practice; however, there is no clear consensus on best practices or criteria for administration. Further studies are needed to define the role of IA thrombolysis in the context of MT in the modern endovascular era.

Keywords: Thrombolytics, Acute Ischemic Stroke Intervention, Intra-Arterial Therapy

Financial Disclosures: The authors had no disclosures.

Impact of Direct Angiosuite Triage in Stroke Care of Transferred Patients for Endovascular Thrombectomy

<u>Aldo A Mendez, M.D.</u>¹, Cynthia B Zevallos, M.D.¹, Andrea L Holcombe, Ph.D.¹, Darko E Quispe, M.D.¹, Sameer Ansari, CNA¹, Andres Dajles, M.S.¹, Khaled Asi, M.D.¹, Kaustubh Limaye, M.D.¹, Edgar A Samaniego, M.D., M.S.¹, Sudeepta Dandapat, MBBS¹, Santiago Ortega-Gutierrez, M.D., M.Sc.¹

¹University of Iowa, Iowa City, Iowa, USA

Introduction:

Selection paradigms not involving advanced imaging and software processing may reduce time to treatment in patients with acute LVO and increase access in underdeveloped countries. To reduce treatment times in transferred patients with suspected LVO, we initiated a direct admission to angiosuite (DAN) strategy in 2017. We aim to describe its association with functional outcome and compare the workflow to patients transferred to the emergency department.

Methods:

We conducted a retrospective cohort study of transferred patients presenting ≤6 hours from stroke onset with suspected anterior circulation LVO who underwent mechanical thrombectomy (MT) from January 2015 to January 2019. Two groups were identified; patients with DAN and patients evaluated in the ED prior to MT. We reviewed patient demographics, radiological features and workflow times. Primary outcome was mRS at 90-days. Secondary outcomes included workflow times and NIHSS at admission and discharge difference (ΔNIHSS). Logistic and ordinal regression were used to evaluate associations.

Results:

42 patients underwent DAN, while 167 were initially evaluated in the ED. There was no difference in age, IV tPA, and onset-to-door time between the two groups. There was a difference in baseline NIHSS (19[15-21] vs. 16[12-21]; P=0.03). Rates of TICI 2b/3 recanalization were comparable (90.5% vs. 79%; P=0.09). The median door-to-puncture time (14.5[11-20] vs. 79[53-104]; P=<0.0001); and onset-to-puncture time (211[177-291] vs. 292[236-360]; P=<0.0001) were significantly shorter in DAN patients. When excluding for mortality, Δ NIHSS was significantly higher for DAN patients (12[8-16] vs. 9[3-13]; P=0.01). Both groups showed a similar mRS rate at discharge (p=0.3) and at 90-days (p=0.05). There was a higher mortality rate in DAN patients (P=0.0001).

Conclusions:

DAN is associated with reduced workflow times. Although this might translate to potentially improve functional outcomes, lager prospective cohorts are needed to evaluate this effect. Lack of imaging selection might translate in higher mortality rate in a subgroup of fast progressors.

Keywords: Acute Stroke, Mechanical Thrombectomy, Ischemic Stroke

Financial Disclosures: The authors had no disclosures.

CLINICAL ABSTRACTS-E-Poster ONLY: PRIMARY CATEGORY - SYSTEMS OF STROKE CARE

E-Poster 153

Interhospital Transfer For Endovascular Stroke Therapy Is Associated With Worse Outcomes <u>Tyler M Schmidt, MS4</u>¹, Steven Warach, MD PhD¹, Ramsey Ashour, MD¹, James Waldron, MD¹, Jefferson Miley, MD¹

¹University of Texas at Austin - Dell Medical School, Austin, Texas, USA

Introduction:

There is considerable controversy and variability regarding the triage disposition of suspected acute ischemic stroke (AIS) patients with large vessel occlusions. Hospital selection by emergency medical services (EMS) is often driven by stroke center proximity regardless of endovascular capabilities, resulting in interhospital transfer (IHT) that may unnecessarily delay endovascular treatment (EVT) and worsen outcomes.

Methods:

Patient demographics, stroke time metrics, admission National Institutes of Health Stroke Scale (NIHSS) scores, and discharge modified Rankin Scale (mRS) scores were retrospectively obtained for AIS patients who underwent EVT from October 2016 to September 2018. Patients were divided into two groups based on whether they underwent IHT prior to EVT (IHT versus non-IHT). T-test and chi-square were used to analyze group differences.

Results:

A total of 107 patients (mean age ± standard deviation, 65.9±15.3 years) underwent EVT. IHT occurred in 26 patients (24.3%), while 81 (75.7%) presented directly to a treatment facility. Group comparisons (IHT versus non-IHT) demonstrated equivalent demographics, comorbidities, admission NIHSS scores (19±4.9 versus 19.6±7.3, p=0.84), and alteplase administration (53.8% versus 54.3%, p=0.97). The IHT group demonstrated lower TICI 2b/3 recanalization rates (73.1% versus 92.6%, p=0.01), longer procedure times (53.7±35 versus 38.1±31 minutes, p=0.052), and equivalent recanalization attempts (2.5±1.6 versus 2.2±1.7 passes, p=0.21). There was an expected significant delay from initial door to groin (206±82 versus 151±72 minutes, p=0.004) in the IHT group. Outcome analyses reflected a trend toward significance in discharge mRS scores of 0-2 (IHT=15.4% versus non-IHT=34.6%, p=0.06). Rates of symptomatic intracerebral hemorrhage (7.69% versus 8.64%, p=0.88) and in-hospital mortality (11.5% versus 13.6%, p=0.79) were equivalent.

Conclusions:

The significant treatment delay and trend toward worse outcomes after IHT warrant consideration of regional EMS protocol changes favoring direct delivery of patients to endovascular stroke centers.

Keywords: Door To Groin Puncture, Acute Ischemic Stroke Intervention, Mechanical Thrombectomy, NIHSS

Financial Disclosures: The authors had no disclosures.

The Great Triage Debate: Finding the Perfect LVO Tool

<u>Alicia Richardson, MSN, ACCNS-AG, ANVP-BC</u>¹, Kevin Cockroft, MD, FAHA¹, Cheran Elangovan, MD¹, Nora Elfiky, MD¹, Frank Jareczek, MD¹, Justin Lowe, PA¹, Adeolu Morawo, MD¹, Kathy Morrison, MSN, RN, CNRN, SCRN, FAHA¹, Muhammad Niazi, MD², Varun Padmanaban, MD¹, Cesar Velasco, RN¹, Grant Zeigler, MD¹, Vivek Satyasi, MD¹, David Ermak, DO¹

¹Penn State Health, Hershey, Pennsylvania, USA; ²UNC Health Care, Chapel Hill, USA

Introduction:

The ideal Large Vessel Occlusion (LVO) pre-hospital tool should be simple to use, minimize missed LVOs, and avoid over-triage of false positives. Many tools have been created and published, but no tool has shown significant superiority.

Methods:

We performed a retrospective analysis of 2,336 acute ischemic stroke patients from January 2015 to February 2019. Three-hundred patients were excluded for lack of angiography, presentation > 24 hours from last known well, or unknown time of symptom onset, leaving 2,036 patients for analysis. We used presenting NIHSS score to calculate the performance of the most common LVO tools (VAN, CPSSS, FAST-ED, RACE, PASS, 3-ISS, MEND), and subsequently performed logistical regression using the various components of the NIHSS score.

Results:

Of the 2,036 patients analyzed, 682 (33.5%) had an LVO (M1/M2, ICA, BA). The NIHSS score components with the strongest correlation with presence of LVO were face, aphasia/level of consciousness questions, neglect, gaze preference, and sensory, with which we created the acronym "FANGS." Analyzing those components results in an area under the curve of 0.934, sensitivity of 0.82, specificity of 0.85, false negative rate (FNR) of 9%, and false positive rate (FPR) of 26%.

Conclusions:

Compared to existing tools, FANGS displays the lowest FNR and FPR, though modest. No tool both maximizes the rate of LVO and minimizes the rate of over-triage. FANGS exploits a simple scoring paradigm of present or absent and misses fewer LVOs than complex comparators like RACE and FAST-ED, which involve calculating a score. FANGS modestly improves the rate of over-triage when compared to other simple tools such as C-STAT and PASS. The FPRs remain high (at least > 20%) among all tools tested. Finding the perfect LVO tool is difficult, and it is more likely that a technological solution will be the ultimate winner in the great triage debate.

Keywords: Ischemic Stroke, Acute Ischemic Stroke Intervention, Scale

Financial Disclosures: Neurovascular consultant for Stryker

CLINICAL ABSTRACTS—E-Poster ONLY: PRIMARY CATEGORY – SYSTEMS OF STROKE CARE

E-Poster 155

Real Time Smart Data Collection and Analysis Using THE EPIC EMR SYSTEM at Erlanger Hospital <u>Ruchir Shah, MD</u>¹, Thomas Devlin, MD, PhD¹, Peter Catalano, Consulting Service¹, Traci Jennings, MHA¹, Henry Christoph, Jr, eCHART team¹, Gailynn Robinson, RN¹

¹Erlanger Health Science Institute, Chattanooga, Tennessee, USA

Introduction:

Hospitals required to report a large number of quality measures to CMS and the Joint Commission. For Comprehensive Stroke Centers, this entails reporting several hundred clinical data points for each patient. Despite spending million dollars for EMR, most hospitals manually abstract data from clinical documentation, a slow and expensive process. Furthermore, to improve physician efficiency, Consult Notes and Discharge Reports need to be automatically created by the EMR system by extracting clinical data into standardized templates. For quality improvement, cost-reduction and managerial efficiency, vast amounts of patient data in the EMR need to be translated into a data base that can be queried, reported and analyzed. Our goal is to generate real time data capturing system that can fulfill these requirements.

Methods:

Series of flowsheets were created to facilitate electronic data abstraction. The flowsheets were tied together by the stroke navigator. Ultimately, software integration of financial data from Cost-Accounting (the "Costflex" IT system), rehab data from various inpatient rehab facilities and Data warehouse in the EPIC system (Caboodle). Generate clinical, quality, financial and rehab reports without manual abstraction.

Results:

With this system in place, we are able to identify all stroke patients in hospital and capture real time data. We can automatically translate this information into a data base for query and reporting, thus eliminating manual abstraction. Able to automatically generate clinical reports, Neuro-Consult note and Patient Discharge Note.

Conclusions:

With this system we are efficiently capturing all stroke data elements and creating reports in real time. We can create clinical report as well as generating clinical documentation from EPIC system. Next goal is to integrate prehospital, financial, and rehab data.Ultimately, generate one report for a patient from prehospital to rehab including finance. Also, we are working to integrate this data with the get with the guideline system.

Keywords: Invention, New Innovation, Stroke, Health Economic

Financial Disclosures: The authors had no disclosures.