



# Society of Vascular and Interventional Neurology 9<sup>th</sup> Annual Meeting & 4<sup>th</sup> Annual Stroke Center Workshop

November 16-19, 2016

The New York Marriott Brooklyn Bridge | Brooklyn, New York

## Platform Session I

Thursday, November 17, 2016 | 5:00 – 6:00 pm

Moderators: Thanh Nguyen, MD, FSVIN and Tanzila Shams, MD

Time	Title	Presenting Author First Name	Presenting Author Last Name
5:00 - 5:10 pm	Outcomes with Transfer Directly to the Angiosuite for Acute Stroke Thrombectomy to Reduce Reperfusion Delay	Cynthia	Kenmuir
5:10 - 5:20 pm	Eloquence-Weighted Imaging Improves Clinical Outcomes Prediction in Endovascular Stroke Therapy	Sunil	Sheth
5:20 - 5:30 pm	Endovascular Treatment in Acute Stroke Patients with Large Core/ Large Mismatch Imaging Profile	Mehdi	Bousslama
5:30 - 5:40 pm	Too Good to Intervene? Thrombectomy for Large Vessel Occlusion Strokes with Minimal Symptoms	Diogo	Haussen
5:40- 5:50 pm	Carotid-T Is Not Carotid-T In Ischemic Stroke: Outcome After Mechanical Thrombectomy Differs Inbetween Occlusion Types	Ossama	Mansour
5:50 - 6:00 pm	Blood Pressure Levels Post Mechanical Thrombectomy and Outcomes in Large Vessel Occlusion Strokes	Abhi	Pandhi

**ABSTRACT DISCLAIMER:** All Abstract information is published as submitted.

## **Platform Session I, Thursday, November 17, 5:00 - 5:10 pm**

### **Outcomes with Transfer Directly to the Angiosuite for Acute Stroke Thrombectomy to Reduce Reperfusion Delay**

Cynthia L. Kenmuir, MD PhD<sup>1</sup>, Tudor G. Jovin, MD<sup>1</sup>, Brian T. Jankowitz, MD<sup>1</sup>, Andrew F. Ducruet, MD<sup>1</sup>, Bradley Gross, MD<sup>1</sup>, Amin Aghaebrahim, MD<sup>1</sup>, Alhamza Al-Bayati, MD<sup>1</sup>, Hazem Shoirah, MD<sup>1</sup>, Ashutosh P. Jadhav, MD PhD<sup>1</sup>

<sup>1</sup>*University of Pittsburgh Medical Center, Pittsburgh, Pennsylvania, USA*

#### **Introduction:**

Time from symptom onset until reperfusion is correlated to outcome following acute stroke intervention. Ongoing efforts focus on streamlining the time needed to adequately assess a patient during an acute stroke in order to offer endovascular therapy as quickly as possible.

#### **Methods:**

A retrospective chart review was conducted to evaluate outcomes for acute stroke patients treated with endovascular therapy at a large academic comprehensive stroke center comparing patients who were taken directly from the helipad to the angiosuite versus those who received additional assessments in the emergency room prior to endovascular reperfusion.

#### **Results:**

Cases were reviewed from Jan 2013 to July 2016 in order to capture all cases who were transferred directly to the angiosuite upon arrival. Of 563 patients undergoing endovascular thrombectomy, 73 patients (13%) were taken directly to the angiosuite without evaluation in the emergency room including no additional brain or vessel imaging. Preliminary results include a significant reduction in mean door to puncture (12 minutes) and door to recanalization times (72 minutes) without a significant increase in sICH when patients were transferred directly to the angiosuite. There was a trend towards smaller final infarct volumes in patients taken directly to the angiosuite versus patients who underwent additional assessment prior to endovascular treatment. Mean length of stay was similar between the groups (5 days ICU, 12 days total). MRS at discharge was improved in patients taken directly to the angiosuite (mean 2.9 versus 3.9), but MRS at 90 days was unchanged.

#### **Conclusions:**

Taking patients directly to the angiosuite for endovascular reperfusion during an acute stroke can reduce the delay from symptom onset to reperfusion. In 73 patients with LVO transferred directly to the angiosuite for endovascular thrombectomy, there was a trend towards smaller infarct volumes with unchanged rates of sICH.

**Keywords:** Acute Ischemic Stroke Intervention, Door To Groin Puncture, Endovascular Therapy, Recanalization, Ischemic Stroke

**Financial Disclosures:** The authors had no disclosures.

**Grant Support:** None.

## Platform Session I, Thursday, November 17, 5:10 - 5:20 pm

### Eloquence-Weighted Imaging Improves Clinical Outcomes Prediction in Endovascular Stroke Therapy

Sunil A. Sheth, MD<sup>1</sup>, David S. Liebeskind, MD<sup>2</sup>, Conrad W. Liang, MD, PhD<sup>3</sup>, Albert J. Yoo, MD<sup>4</sup>, Reza Jahan, MD<sup>2</sup>, Raul G. Nogueira, MD<sup>5</sup>, Vitor M. Pereira, MD<sup>6</sup>, Jan Gralla, MD<sup>7</sup>, Greg Albers, MD<sup>8</sup>, Mayank Goyal, MD<sup>9</sup>, Jeffrey L. Saver, MD<sup>2</sup>

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#### Introduction:

Larger infarct size at presentation as determined by ASPECTS is associated with reduced likelihood of good outcome in acute ischemic stroke. Incorporating the relative eloquence of each ASPECTS region may improve the predictive power.

#### Methods:

In the combined database of the SWIFT, STAR, and SWIFT PRIME trials, we identified patients treated with the Solitaire stent retriever. Using the 24hr CT scan, a multivariate linear regression was used to determine the relative contribution of each ASPECTS region, separately in each hemisphere, to freedom from disability (mRS 0-2) at 90 days. The coefficients from the regression were used to create an Eloquence-weighted ASPECTS score (EL-ASPECTS), which was compared against the original in predicting outcome.

#### Results:

Among 342 patients treated with ET, average age was 67, 57% were female, and NIHSS was mean 17 (SD +/- 5). Mean ASPECTS at presentation was 8.2 (SD 1.7). The most commonly involved ASPECTS regions were the lentiform nuclei (70%), insula (55%), and caudate (52%). In multivariate analysis, for the right hemisphere on 24hr CT, preservation of M6 (b=9.7) and M4 (b=4.4) regions were most strongly predictive of good outcome. For the left hemisphere on 24 hr CT, preservation of M6 (b=5.5), M5 (b=4.1) and M3 (b=3.1) were most predictive. Eloquence weights were assigned to all 20 R/L ASPECTS regions to create EL-ASPECTS. EL-ASPECTS, compared with original ASPECTS, demonstrated improved discrimination for independent functional outcome (C-statistic 0.67 vs. 0.74 (EL-ASPECTS Right Hemisphere and 0.78 EL-ASPECTS Left Hemisphere).

#### Conclusions:

Incorporation of regional weighting into ASPECTS improves the ability to predict who will achieve independent functional outcomes with endovascular therapy in acute ischemic stroke.

**Keywords:** Endovascular, Solitaire, Aspects, Cerebrovascular Disease, Invention

**Financial Disclosures:** The authors had no disclosures.

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**Platform Session I, Thursday, November 17, 5:20 - 5:30 pm**

**Endovascular Treatment in Acute Stroke Patients with Large Core/ Large Mismatch Imaging Profile**

Mehdi Bouslama, MD<sup>1</sup>, Leticia C. Rebello, MD<sup>1</sup>, Diogo C. Haussen, MD<sup>1</sup>, Seena Dehkharghani, MD<sup>1</sup>, Jonathan A. Grossberg, MD<sup>1</sup>, Samir R. Belagaje, MD<sup>1</sup>, Michael R. Frankel, MD<sup>1</sup>, Raul G. Nogueira, MD<sup>1</sup>

<sup>1</sup>Emory University SOM/ Grady Memorial Hospital, Atlanta, Georgia, USA

**Introduction:**

Endovascular therapy (ET) is typically not considered for patients with large baseline ischemic cores. Perfusion imaging may identify a subset of large core patients who remain at risk for significant infarct expansion and thus could still benefit from reperfusion to reduce their degree of disability. We sought to compare the outcomes of patients with large baseline CT perfusion core undergoing ET to matched controls who had medical care alone.

**Methods:**

A matched case-control study of stroke patients with proximal occlusion (intracranial ICA and/or MCA-M1 or M2) on CT angiography and baseline core >50mL on CT perfusion, at a tertiary care center between May 2011 and October 2015. Patients receiving ET and controls receiving medical treatment alone were matched for age, baseline CTP core volume, and glucose levels. Baseline characteristics and outcomes were compared.

**Results:**

Fifty-six patients were matched across two equally distributed groups. Baseline characteristics were comparable. ET was significantly associated with a favorable shift in the overall distribution of 90-day mRS scores (OR=2.56, 95%CI [2.5-8.47]; p=0.04), higher rates of independent outcomes (90-day mRS 0-2, 25% vs. 0%, p=0.04), and smaller final infarct volumes (87±77 vs. 242±120mL, p=0.04). Patients <70mL (n=12 pairs) showed a significant reduction in final infarct volumes (110±65 vs. 319±147mL, p=0.04). Patients ≥75 years (n=11) had poor outcomes (mRS >3) at 90 days.

**Conclusions:**

In properly selected patients, ET appears to benefit patients with large core/ large mismatch profile. Future prospective studies are warranted.

**Keywords:** Ischemic Stroke, Intra-Arterial Therapy, Imaging

**Financial Disclosures:** The authors had no disclosures.

**Grant Support:** None.

**Platform Session I, Thursday, November 17, 5:30 - 5:40 pm**

**Too Good to Intervene? Thrombectomy for Large Vessel Occlusion Strokes with Minimal Symptoms**

Diogo C. Haussen, MD<sup>1</sup>, Mehdi Bousslama, MD<sup>1</sup>, Jonathan A. Grossberg, MD<sup>1</sup>, Aaron Anderson, MD<sup>1</sup>, Samir R. Belagaje, MD<sup>1</sup>, Michael R. Frankel, MD<sup>1</sup>, Nicolas Bianchi, MD<sup>1</sup>, Leticia C. Rebello, MD<sup>1</sup>, Raul G. Nogueira, MD<sup>1</sup>

<sup>1</sup>*Emory University SOM/Grady Memorial Hospital, Atlanta, Georgia, USA*

**Introduction:**

The minimal stroke severity justifying endovascular intervention remains elusive; however, a significant proportion of patients presenting with large vessel occlusion (LVO) and mild symptoms subsequently decline and face poor outcomes. We sought to evaluate our experience with these patients by comparing best medical therapy with thrombectomy in an intention-to-treat analysis

**Methods:**

Analysis of prospectively collected data of all consecutive patients with National Institutes of Health Stroke Scale (NIHSS) score  $\leq 5$ , LVO on CT angiography, and baseline modified Rankin Scale (mRS) score 0–2 from November 2014 to May 2016. After careful discussion with patients/family, a decision to pursue medical or interventional therapy was made. Deterioration (development of aphasia, neglect, and/or significant weakness) triggered reconsideration of thrombectomy. The primary outcome measure was NIHSS shift (discharge NIHSS score minus admission NIHSS score).

**Results:**

Of the 38 patients qualifying for the study, 26 (68%) were primarily treated with medical therapy and 12 (32%) intervention. Baseline characteristics were comparable. Ten (38%) medically treated patients had subsequent deterioration requiring thrombectomy. Median time from arrival to deterioration was 5.1 hours (2.0–22.5). Successful reperfusion (modified Treatment in Cerebral Infarction 2b–3) was achieved in all 22 thrombectomy patients. The NIHSS shift significantly favored thrombectomy ( $-2.5$  vs  $0$ ;  $p=0.03$ ). The median NIHSS score at discharge was low with both thrombectomy (1 (0–3)) and medical therapy (1.5 (0–4)). 90-Day mRS 0–2 rates were 100% and 69.2%, respectively ( $p=0.039$ ). Multivariable linear regression indicated that thrombectomy was independently associated with a beneficial NIHSS shift (unstandardized  $\beta$   $-3.2$  (95% CI  $-6.3$  to  $-0.06$ );  $p=0.04$ ).

**Conclusions:**

Thrombectomy led to a shift towards a lower NIHSS in patients with LVO presenting with minimal stroke symptoms. Despite the overall perception that this condition is benign, nearly a quarter of patients primarily treated with medical therapy did not achieve independence at 90 days.

**Keywords:** Ischemic Stroke, Intra-Arterial Therapy

**Financial Disclosures:** The authors had no disclosures.

**Grant Support:** None.

**Platform Session I, Thursday, November 17, 5:40- 5:50 pm**

**Carotid-T IS NOT carotid-T IN ISCHEMIC STROKE: outcome after MECHANICAL THROMBECTOMY differs inbetween occlusion types.**

ossama y mansour, Prof. Dr. med.<sup>1</sup>

<sup>1</sup>*Alexandria university hospital ,Stroke and endovascular center, alexandria, Egypt*

**Introduction:**

Acute occlusions of the carotid T are associated with a devastating clinical outcome. IV thrombolysis has a low recanalization rate with only about 10% and the proportion of patients with good outcome. additionally ,MT in Acute carotid-T occlusion results are both low in recanalization rates and poor in outcomes. We investigated clinical outcomes after recanalization in type I ,II, and III carotid T occlusions.

**Methods:**

From 2013 to 2016 , mechanical thrombectomy was done for 125 patients , where reviewing the data of this patient showed that 44 patients were presented as Carotid T occlusions.

**Results:**

Among the included patients, 23 (52.3%) were classified as having type I , 17 (38.6%) patients as type II and 4 (9.1%) patients were type III. Patients in the Type I occlusion group were younger ( $57.9\pm 12.1$  vs.  $60.5\pm 11.0$  years Type II , vs  $61.8\pm 13.7$  years Type III group of patients  $P=0.73$ ), achievement of successful reperfusion was higher in the type I group ( $91.3\%$  vs.  $76.5\%$  for type II and  $25\%$  for type III,  $P=0.009$ ), whereas the occurrence of symptomatic hemorrhage was significantly higher in type III group when compared with type I and II ( $75\%$  vs.  $4.3\%$  and  $17.6\%$ ,  $P=0.002$ ). The median NIHSS scores at discharge were 6 vs 12 in the type I & type II vs type III groups, respectively ( $P<0.043$ ). good outcomes at 3 months were more frequently reported in type I and II ( $P<0.019$ ) and the 3-month mortality rate was significantly lower in the type I group ( $P<0.005$ )

**Conclusions:**

carotid-T occlusions could be classified into 3 types according to the study of robustness of collaterals. In our cohort, type I , looks to be the fastest type to be recanalized and the type of occlusion with better outcome and reperfusion rate.

**Keywords:** Acute Stroke, Acute Ischemic Stroke Intervention, Carotid, Clinical Trial, Stent retriever

**Financial Disclosures:** The authors had no disclosures.

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**Platform Session I, Thursday, November 17, 5:50 - 6:00 pm**

## **Blood Pressure Levels Post Mechanical Thrombectomy and Outcomes in Large Vessel Occlusion Strokes**

Abhi Pandhi, MD<sup>1</sup>, Nitin Goyal, MD<sup>1</sup>, Georgios Tsivgoulis, MD<sup>1</sup>, Kira Dillard, MD<sup>1</sup>, Katherine Nearing, MD<sup>1</sup>, Daniel Hoit, MD<sup>2</sup>, Adam Arthur, MD<sup>2</sup>, Lucas Elijovich, MD<sup>1</sup>, Andrei Alexandrov, MD<sup>1</sup>

<sup>1</sup>Neurology, University of Tennessee Health Science Centre, Memphis, Tennessee, USA; <sup>2</sup>Neurosurgery, University of Tennessee Health Science Centre, Memphis, Tennessee, USA

### **Introduction:**

Higher pre-treatment blood-pressure (BP) levels have been associated with poor outcome after mechanical-thrombectomy (MT) for acute ischemic stroke (AIS) patients with emergent-large-vessel-occlusion (ELVO). However, there are limited data evaluating post-MT BP levels and early outcomes of patients with ELVO. We sought to investigate the association of BP course following MT with early safety and efficacy outcomes in ELVO patients.

### **Methods:**

Consecutive AIS patients presenting with ELVO and treated with MT in a tertiary stroke center during a 3-year period were prospectively evaluated. Hourly systolic-BP (SBP) and diastolic-BP values were recorded for up to 24 hours post MT. Symptomatic intracranial hemorrhage (sICH) rates, 3 months mortality and favorable functional outcome (FFO) at three months were documented (modified-Rankin-Scale score of 0-2) using standard definition.

### **Results:**

Our study population consisted of 217 AIS patients with ELVO [mean age 62±14 years, median NIHSS-score: 16 points (IQR 12-21)]. Higher maximal SBP levels during the 24-hour monitoring period were documented in patients who died during the three-month follow-up period (184±/-24mmHg vs. 167±/-21mmHg; p0.8). A 10mmHg increment in maximal SBP was independently (p<0.001) associated with a lower likelihood of three-month FFO (OR: 0.72; 95%CI: 0.60-0.86) and a higher-likelihood of three-month mortality (OR:1.42, 95%CI: 1.19-1.70) in multivariable logistic regression models adjusting for multiple cofounders.

### **Conclusions:**

Higher maximal SBP post MT appears to be an independent predictor of increased three-month mortality and lower rates of 3-month FFO in patients with ELVO. Multi-center independent studies are needed to confirm our preliminary findings and to evaluate if aggressive BP control post MT holds any benefits in terms of early survival and functional improvement.

**Keywords:** Acute Ischemic Stroke Intervention, Acute Stroke, Blood Pressure Management In Acute Stroke

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## Platform Session II

Saturday, November 19, 2016 | 8:00 – 9:00 am

Moderators: Michael G. Abraham, MD and Robin Novakovic, MD, FSVIN

Time	Title	Presenting Author First Name	Presenting Author Last Name
8:00 - 8:10 am	Development of a Canine Endovascular Reversible Middle Cerebral Artery Occlusion Stroke Model-Anterior Circulation Approach	Luis	Guada
8:10 - 8:20 am	Simplified NIH Stroke Scale Without Loss Of Predictive Accuracy: A Factor Analysis Approach	Syed Ali	Raza
8:20 - 8:30 am	Did SAMMPRIS Change How Symptomatic Intracranial Atherosclerotic Disease is Managed?	Kavit	Shah
8:30 - 8:40 am	Utility of Real-time Angiographic Perfusion Imaging in Endovascular Treatment of Cerebral Vasospasm	Christopher	Donaldson
8:40 - 8:50 am	Comparative Study of the Clinical Outcome Following Carotid Stenting With or Without Embolic Protection Device	Moustafa	Aly
8:50 - 9:00 am	Stent-Assisted Coiling of Dural Sinus Diverticulae: A Case Series	Sanjeev	Keshary

**ABSTRACT DISCLAIMER:** All Abstract information is published as submitted.



**Platform Session II, Saturday, November 19, 8:00 - 8:10 am**

**Development of a Canine Endovascular Reversible Middle Cerebral Artery Occlusion Stroke Model-Anterior Circulation Approach**

Luis Guada, MD<sup>1</sup>, Kunakorn Atchaneeyasakul, MD<sup>1</sup>, Mitsuyoshi Watanabe, MD<sup>1</sup>, Kevin Ramdas, MD<sup>1</sup>, Dileep Yavagal, MD<sup>1</sup>

<sup>1</sup>*University of Miami, Miami, Florida, USA*

**Introduction:**

The STAIR criteria recommend the use of large animal stroke models for translation of certain novel stroke therapies. Multiple techniques have been published to induce MCA-infarction in the canine species for research, a minimally-invasive, endovascular, anterior circulation access to reversibly occlude the MCA (MCAo) has not been established. The aim of this study is to show that we have successfully established a novel endovascular MCAo model in canines, via endovascular access of the MCA territory through the internal carotid artery (ICA).

**Methods:**

With the Institutional Animal Care and Use Committee's approval, 56 mongrel-hounds 1-4 years of age, weighting 22(±5 kg), underwent transfemoral endovascular catheterization and occlusion of the distal ICA-MCA - with a single soft platinum detachable aneurysm embolization coil. Three groups with different occlusion times: 120 min. MCA recanalization was established by coil retraction. The canines were survived for 15-60 days. Weekly neurological scoring was performed. Brain MRIs-MRAs were obtained between 1-60 days post-MCAo. Stroke volumes were measured for all the canines in the study. DTI-DTT analysis of the Corticospinal Tract was also acquired for the last 10 canines.

**Results:**

Successful MCAo with recanalization was achieved in 39/56 canines. We were able to achieve control of occlusion time and average of stroke volume: 120 min= 6.2 cc (+/-6.9 cc) which also correlates with the neurological assessment scores. Unplanned death or premature euthanasia occurred in 17/56 canines (30 %). We observed 52% feasibility on achieving MCAo in the first 12/23 consecutive canines, then 70% in the subsequent 16/23, and 80% (8/10) in the last 10 canines.

**Conclusions:**

Here we report the successful development of an endovascular reversible MCAo model in the canine by an anterior circulation approach. A learning curve is seen in the successful implementation of this model, as shown by our results.

**Keywords:** Basic Sciences, Endovascular, Stroke, Invention, Ischemic Stroke

**Financial Disclosures:** The authors had no disclosures.

**Grant Support:** None.

**Platform Session II, Saturday, November 19, 8:10 - 8:20 am**

**Simplified NIH Stroke Scale Without Loss Of Predictive Accuracy: A Factor Analysis Approach**

Syed Ali Raza, Postdoctoral Researcher, MD<sup>1</sup>, Michael Frankel, Professor, MD<sup>1</sup>, Srikant Rangaraju, Assistant Professor, MD<sup>1</sup>

<sup>1</sup>*Emory University, Department of Neurology, Atlanta, Georgia, USA*

**Introduction:**

The 24-hour neurologic exam (NIHSS) has been shown to strongly predict long-term functional outcomes in patients with large vessel occlusion (LVO). We sought to determine the components of the NIHSS that contribute most to long-term prognosis and attempt to simplify the NIHSS without loss of predictive power.

**Methods:**

In a secondary analysis of IMS-III endovascular stroke trial, we performed factor analysis to resolve the 15 NIHSS items into principal components, analyzing right and left hemispheric strokes separately. The principal components (PC) that explained the highest percentage of variance in NIHSS were identified and within these, the most important variables were selected. Various iterations of simplified NIHSS scales were developed and the predictive powers of simplified NIHSS scores were compared to the composite 24-hour NIHSS for 3-month good outcome (mRS 0-2) using Receiver-Operator-Characteristic curve analyses.

**Results:**

Of 656 IMS-III participants, 643 had 3-month mRS outcomes. A two principal component solution was identified for both right and left hemispheric strokes. In left hemispheric strokes, PC1 and PC2 explained 59.9% of variance in 24-hour NIHSS and the most important NIHSS variables included LOC-1B, right arm and leg weakness, language and neglect. In right hemispheric strokes, PC1 and PC2 explained 60.9% of variance in 24-hour NIHSS and the most important NIHSS variables included LOC-1B, 1C, left arm and leg weakness and language. Various simplified NIHSS iterations were tested. As compared to the composite NIHSS (AUC=0.89) in left hemispheric strokes, the simplified NIHSS that included language, LOC-1B and right arm weakness (AUC=0.88) had the highest predictive accuracy. In right hemispheric strokes, a simplified NIHSS that included LOC-1B and left arm weakness also had high predictive accuracy (AUC=0.89) as compared to the composite NIHSS (AUC=0.93).

**Conclusions:**

We identify key components of the neurologic exam that have the highest prognostic value in determining long-term outcomes in LVO stroke.

**Keywords:** NIHSS, Ischemic And Hemorrhagic Stroke, Endovascular Therapy

**Financial Disclosures:** The authors had no disclosures.

**Grant Support:** None.

**Platform Session II, Saturday, November 19, 8:20 - 8:30 am**

**Did SAMMPRIS Change How Symptomatic Intracranial Atherosclerotic Disease is Managed?**

Kavit Shah, M.D.<sup>1</sup>, Sumul Modi, M.D.<sup>1</sup>, Tarun Girotra, M.D.<sup>1</sup>, Horia Marin, M.D.<sup>2</sup>, Panayiotis Mitsias, M.D., PhD<sup>1</sup>

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**Introduction:**

In 2011, the published results of the SAMMPRIS trial revealed that aggressive medical management is superior to percutaneous transluminal angioplasty and stenting for prevention of stroke in the setting of symptomatic intracranial stenosis. We sought to investigate what impact, if any, did the SAMMPRIS trial have upon utilization of intracranial arterial stent placement (ICS).

**Methods:**

Nationwide Inpatient Sample from year 2004 to 2013 was utilized to identify patients who underwent ICS (International Classification of Diseases, Ninth Revision [ICD-9] procedure code 00.65). In order to exclude potentially overlapping conditions, patients who underwent intracranial coil embolization, along with those that carried diagnosis of subarachnoid hemorrhage, non-ruptured cerebral aneurysm, idiopathic intracranial hypertension or cerebral venous sinus thrombosis were excluded. National estimates of the number of these procedures along with standard deviation (SD) were obtained using the discharge weights.

**Results:**

Estimated number of ICS in the United States sharply increased from 38 (SD ±5) in year 2004 to 844 (SD ±91) in year 2010. Thereafter, there was a decline with 592 (SD ±92), 780 (SD ±47) and 565 (SD ±29) procedures done in 2011, 2012 and 2013, respectively. This overall trend was observed across various demographic and hospital subgroups.

**Conclusions:**

The results of the SAMMPRIS trial had a significant impact on ICS utilization given the decline in utilization rate of ICS in 2011; however, the procedure is still being performed in a relatively higher than expected number. Verification of this trend and thorough investigation into its reasons using hospital level data is needed.

**Keywords:** Carotid Stenting And Angioplasty, Stenting, Intracranial Stenosis Stenting And Angioplasty, Ischemic Stroke,

**Financial Disclosures:** The authors had no disclosures.

**Grant Support:** None.

**Platform Session II, Saturday, November 19, 8:30 - 8:40 am**

**Utility of Real-time Angiographic Perfusion Imaging in Endovascular Treatment of Cerebral Vasospasm**

Christopher S. Donaldson, BMBS<sup>1</sup>, Leon Lai, MBBS, PhD, FRACS<sup>1</sup>, Leeanne Slater, MBBS, MMed, FRANZCR<sup>2</sup>, Winston Chong, MBBS, FRANZCR<sup>2</sup>, Ronil V. Chandra, MBBS, MMed, FRANZCR<sup>2</sup>

<sup>1</sup>*Department of Neurosurgery, Monash Health, Melbourne, Australia;* <sup>2</sup>*Diagnostic and Interventional Neuroradiology Service, Monash Imaging, Monash Health, Melbourne, Australia*

**Introduction:**

Angiographic perfusion imaging derived from digital subtraction angiography (DSA) is not routinely utilized for patients with cerebral vasospasm after aneurysmal subarachnoid hemorrhage. We investigate the utility of this technique for endovascular vasospasm treatment procedures.

**Methods:**

Real-time blood flow analysis was performed using parametric colour coding on pre- and post-intervention DSA. Semi-quantitative parenchymal perfusion parameters [arrival time (AT) of contrast, time to peak (TTP) opacification and mean transit time (MTT) of contrast] were calculated across 3 vascular territories [anterior cerebral artery (ACA), middle cerebral artery (MCA) and Lenticulostriate (LtA)] using standard 2-dimensional angiographic perfusion software. The pre and post intervention arterial vessel diameters were measured on all included studies. A student's paired t-test was used to assess for statistically significant differences between pre and post treatment values.

**Results:**

Twelve endovascular vasospasm treatment episodes in 6 patients were included. All patients received intra-arterial vasodilator therapy. Following endovascular treatment, parenchymal flow analysis showed improvement in TTP and MTT across all vascular territories ( $p < 0.002$ ) and improvement in AT in the ACA and MCA territories ( $p < 0.03$ ). Improvement in parenchymal perfusion parameters correlated with improvement in vessel diameters in all territories following treatment ( $p < 0.05$ ).

**Conclusions:**

Real-time parenchymal perfusion imaging during endovascular vasospasm treatment procedures is feasible and provides reliable semi-quantitative measurement of angiographic treatment response.

**Keywords:** Vasodilator, Vasospasm, Vasospasm Intervention, Intra-Arterial Therapy, SAH

**Financial Disclosures:** The authors had no disclosures.

**Grant Support:** None.

**Platform Session II, Saturday, November 19, 8:40 - 8:50 am**

**Comparative study of the clinical outcome following carotid stenting with or without embolic protection device.**

Moustafa T Aly, Doctoral degree of neurology<sup>1</sup>

<sup>1</sup>*University of Alexandria, Egypt, alexandria, Egypt*

**Introduction:**

The use of embolic protection during carotid artery stenting (CAS) corresponds to class II evidence, and there is still controversy regarding its benefit, since there is insufficient data comparing its usage versus not using it during CAS we conducted a comparative study of the clinical outcome following carotid stenting with or without the use of distal protection device.

**Methods:**

The material of the study consisted of 40 patients with significant extra-cranial carotid stenosis randomized into two groups, Group A those treated without distal protection device (20 patients, 22 stented carotid stenosis) and Group B treated using distal protection device (20 patients, 21 stented carotid stenosis). The primary end point was the occurrence of any ischemic event related to CAS procedure.

**Results:**

Primary stent placement was successful in all patients, the combined incidence rate of major stroke or death related to procedure within 30 days was not statistically significant between the two groups (9.1% versus 4.8%; P=0.5483). The risks factors associated with ischemic events during procedure were quantified and studied including age, NIHSS, degree and length of stenosis, plaque morphology, type of stent used and other vascular risk factors. The length of stenotic lesion and the high risk plaque morphology were significantly associated with higher risk of preprocedural ischemic events in Group A (P=0.0224 and P=0.0058 respectively), other non-ischemic periprocedural complications were studied including vasospasm, hyperperfusion syndrome and vasovagal reaction, vasospasm was significantly higher in group B (null versus 24%; p=0.0149). There was no statistically significant difference between the mean NIHSS between the two groups during six months follow up period.

**Conclusions:**

In the present study carotid artery stent implantation seemed feasible and safe in both groups, however in patients having carotid stenosis with high risk morphology it may be safer to use a protection device.

**Keywords:** Angioplasty, Intracranial Stenosis Stenting And Angioplasty, Carotid Stenting And Angioplasty, Cerebral Protection, Stenting

**Financial Disclosures:** The authors had no disclosures.

**Grant Support:** None.

**Platform Session II, Saturday, November 19, 8:50 - 9:00 am**

**Stent-Assisted Coiling of Dural Sinus Diverticulae: A Case Series**

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**Introduction:**

Dural sinus diverticulae are a rare vascular etiology of pulsatile tinnitus which can be potentially disabling. Multiple endovascular approaches have been reported in the literature including stenting, coiling, balloon-assisted coiling, and stent-assisted coiling. 4 separate cases of stent-assisted coiling have been reported in the literature up to this point. We present the largest case series of endovascular management of symptomatic dural sinus diverticulum from a single operator using stent-assisted coiling.

**Methods:**

Chart review was performed on consecutive patients who underwent stent-assisted coil embolization for dural sinus diverticulae.

**Results:**

We report 4 total cases from 3 patients, one of whom presented with bilateral pulsatile tinnitus from bilateral dural sinus diverticulae. All 3 patients were female and were treated with endovascular stent-assisted coiling performed under general endotracheal anesthesia. Stenting was performed first, followed by trans-stent coil embolization. All had resolution of symptoms without complications. They were discharged on aspirin 325 mg daily and clopidogrel 75 mg either daily or twice daily, depending on pre-stenting clopidogrel inhibition. While two of the patients were in their early twenties, the patient with bilateral symptomatic diverticulae was 60 years of age at symptom onset after a cerebral angiogram was conducted for evaluation of distal arterial ischemic strokes. One of the patients in her twenties had concurrent intracranial hypertension.

**Conclusions:**

Our case series demonstrates success with stent-assisted coiling for treatment of pulsatile tinnitus. We hope our findings will promote further recognition of dural sinus diverticulae as a possible etiology of pulsatile tinnitus when no other etiology has been found.

**Keywords:** Stent Assisted, Coiling, Endovascular Therapy

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