



# THE CORE

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## Society News

1. The Society of Vascular and Interventional Neurology (SVIN) is celebrating its 5th anniversary since its inception in August 2006.
2. The **4th SVIN Annual Meeting** was held October 21-23, 2011 in Fort Lauderdale, Florida. **Congratulations to Dr. Nogueira**, Chair of the meeting, for coordinating an outstanding clinical and scientific program with national and internationally reknown speakers, including Dr. Isil Saatci, Dr. David Fiorella, Dr. Greg Albers, Dr. Tudor Jovin, Dr. Michael Lev, and Dr. Joshua Hirsch. More details of this year's meeting will be featured in The Core.
3. Several awards were honored at the 4th SVIN Annual Meeting. Congratulations are due to:  
  
Dr. Osama Zaidat, who received an award for his distinguished service to SVIN.  
  
Dr. Lawrence Weschler and Dr. Joshua Hirsch were awarded for their Outstanding Contribution to the field of Vascular & Interventional Neurology.  
  
Dr. Yogesh Moradia was awarded best SVIN abstract.
4. The 5th SVIN Annual Meeting for 2012 is tentatively planned for October 27-28, in Miami, at the Fontainebleu and will be led by Dr. Italo Linfante. For any recommendations on suggested content or how to improve this meeting, please email: [director@svin.org](mailto:director@svin.org).

## PRESIDENT'S MESSAGE



Dear SVIN Members,

We should all be proud of the 4th Annual SVIN meeting in Hollywood, FL. Not only did the meeting set a record for attendance crossing the 200 attendee mark for the first time, but every session in the meeting set a consistently high standard with quality of speakers, content, and lively and informative discussions. The talks on “Telestroke” in interventional neurology added a brand new dimension to the traditional sessions. The number and quality of abstracts again showed an impressive upward trend, indicating a progressive maturation of scientific clinical enquiry and dissemination of new knowledge in our fledgling field. Our corporate sponsors including key industry leaders attended in large numbers to exhibit share and network. We greatly appreciate their continued support and enthusiasm for SVIN. I would like to congratulate Dr. Raul Nogueira and the entire Annual Meeting organizing committee for their exemplary leadership of this very important SVIN mission in 2011 and achieving a smashing success. Hats off to them! They have put the SVIN meeting well on its way to becoming the premier meeting for ischemic stroke intervention.

The recent annual meeting also marked the launch of an ambitious new initiative by the Society: SVIN peer-recognition of excellence and substantial service to the field with award of the title of “Fellow of SVIN (FSVIN)”. Active SVIN members who meet stringent criteria are awarded this title by board vote. Spearheaded by Dr. Andrew Xavier, this exciting program takes a major step in advancing the SVIN mission of encouraging and recognizing public contribution to our field. The sub-specialty of interventional neurology is completing a decade and the number of practicing Interventional Neurologists inches closer to 100. The SVIN Fellow program indicates the high level

of organization and maturation in the field, and raises the public profile of vascular interventional neurology. Dr. Xavier shares details of this vital new program in the next newsletter.

SVIN is re-energizing the participation of active members in the society. Active members are practicing Interventional and Vascular Neurologists who form the core of SVIN. As our membership grows larger, not only do we need to renew our engagement with active members but also increase their ability to influence SVIN activities. The SVIN board has approved my proposal to have a “Topic Proposal” system similar to other premier meetings, starting with the 5th annual meeting. In January, active members will be invited to send talk proposals including speakers and moderators including themselves based on their area of expertise. The annual meeting committee will then adjudicate the proposals to create the meeting program. Another initiative will be to formalize a requirement of an active non-board member on SVIN taskforces and committees.

The fifth SVIN annual meeting will be on October 27-28, 2012 in beautiful Miami Beach. Dr. Italo Linfante, Chair of the meeting, brings tremendous ideas and vast experience with organizing stroke and interventional meetings for other major societies. I have no doubts that this meeting will add another feather in SVIN’s cap.

As we approach the New Year, I wish all of you and your families’ great health, love and peace.

Dileep Yavagal, MD  
SVIN President



We celebrate the 5th anniversary of the Society of Vascular and Interventional Neurology (SVIN) since its inception in August 2006.

A group of 14 interventional neurologists gathered in New York City, pledged to develop and grow the field. Today, SVIN has grown to over 180 members, including medical students, residents, fellows, and our colleagues in interventional neuroradiology. Forged by a group of vascular and interventional neurologists, SVIN has made tremendous strides with the production of their annual meeting, practicum, education, and collaborative research missions.

The 4th annual SVIN meeting held on October 21-23 in Fort Lauderdale, Florida, was the highlight of SVIN activities this year. We congratulate Dr. Raul Nogueira for coordinating a thoughtful and dynamic program, including international and national reknown speakers: Drs. Isil Saatci, Tibor Becske, David Fiorella, Greg Albers, Jeff Saver, Michael Lev, David Liebeskind, and Jordi Blasco. An honorary award was bestowed to Dr. Osama Zaidat, past president of SVIN. His leadership, vision, dedication and infatigable efforts were quintessential in leading SVIN to as successful an organization as we see it today.

In this edition of The Core, we are pleased to introduce a new section entitled "Journal Core Review". We are grateful to introduce Dr. Viktor Szeder, who graciously agreed to inaugurate the first section, with diligent review of three recent studies. In recognition of the growing numbers of junior members in the society, we also place more emphasis on articles with respect to fellowship training. Drs. Szeder, Santiago, and Linares provide insight on the application process for interventional neurology, important tips and timelines, and expectations of a neurointerventional fellow. Dr. Nicholas Tarlov summarized the Society

of Neurointerventional Surgery Fellow conference, providing a flavor for the educational value of this meeting.

We thank our newsletter staff for their contributions in this current edition of The Core. We hope to continue to recruit other SVIN members or interested readers at large to maintain an informative newsletter. This will require a coordinated team effort and we are looking forward to working with all of you. If you have any ideas or interest in writing articles, editorials, or commentary for future SVIN newsletter editions, this would be most welcome. In the interim, Happy Holidays to everyone and Happy New Year.

Sincerely,

Thanh Nguyen  
SVIN Newsletter Editor

Syed Hussain  
SVIN Newsletter Associate Editor

Editor's Corner

# SOCIETY OF VASCULAR AND INTERVENTIONAL NEUROLOGY 4TH ANNUAL MEETING

## MOHAMED S. TELEB, MD

**Hollywood, Florida** - The 4th Annual Society of Vascular and Interventional Neurology (SVIN) meeting was the largest, an affirmation of the continued interest and growth of the field as well as the society. The meeting took place at the Westin Diplomat Hotel in Hollywood Florida. The location was great but the meeting was so enriching that most participants probably didn't go to the beach.

Saturday had an all star line up with the morning sessions dedicated to imaging considerations in acute ischemic stroke. The speakers each had great points for which imaging modality they used. It started off with the most basic of imaging, CT only, by Dr Tudor Jovin from University of Pittsburgh. The title of his talk was "Less is More: The Case for Non-contrast CT." He started his talk by pointing out that NINDs and ECASS III, with level 1 evidence, showed that the earlier you recanalize the better the outcome. His argument then referenced articles indicating time is brain, ASPECTS score as a good way to give you core information, ASPECTS CT and ASPECTS MRI having similar outcomes, and that the core infarct volume is the main determinant of outcome. Lastly he referenced Phan et al's ISC 2011 abstract about slow turn around time with MRIs.

Dr Michael Lev, from the Massachusetts General Hospital, argued that CTP is sufficient for endovascular triage. He included CTA in this definition. He emphasized the idea that imag-



ing is brain and not time is brain.

Dr Greg Albers from Stanford ended the mini debate with "MRI is best" followed by "Automated Software are We There Yet?" He brought up many convincing points. First he believes MRI might help you in making decisions in the cath lab especially if there are several branch occlusions by informing the neurointerventionalist/stroke neurologist which vascular territory is already infarcted & which one needs opening to affect outcome. He also argued that CT is not sensitive enough to tell core & that no one doubts that MRI is best for core. He reiterated that we have a better understanding of what is true core & that DWI reversibility probable does not exist by referencing several cases from DEFUSE 1 and DEFUSE 2 (multiple sessions on this coming in ISC meeting) where on follow up imaging after recanalization, the DWI seems to go away but FLAIR changes always return to the



*Dr. Raul Nogueira, Chair of the 4th annual meeting, delivers his inaugural address.*

original DWI. He also referenced abnormal DWI lesions by pathology from the Journal of CBF & Met 2011. Lastly the actual tissue that will go on to infarct he believes can be best

## SVIN 4TH ANNUAL MEETING (continued)

estimated with MRI using Tmax of 6 referencing both DEFUSE results and Zaro-Weber O et al. Stroke 2010 article showing that Tmax 5.5 corresponded to PET imaging of hypo-perfused tissue.

For the next session Dr. Albers pointed out the pros and cons of automated software but emphasized that it is not ready for prime time. The software is not standardized (i.e. GE, Siemens, etc will give different PWI images), visual estimation is inaccurate, and there is no user interaction (avoid delays and errors). Cons mentioned were post processing for artifacts may be required and inclusion of artifacts could alter mismatch assessment. He mentioned the RAPID software and its accuracy by going back and looking at DEFUSE 1 and EPITHET data to estimate core and hypo-perfused tissue correcting accurately for the studies overestimation of perfusion deficit. Lastly he mentioned that this RAPID software is being used for DEFUSE 2, MR rescue, EXTEND, and ECASS 4. Ironically he did mention the CRISP study that just started which uses CT, CTP, CTA for selection of endovascular treatment. It's ironic cause it's being run from Stanford so even Dr Albers realizes that MRI availability is limited and CT, CTP might have the biggest way to influence acute stroke care and decide who to take to endovascular treatment. CRISP is similar to DEFUSE 2 except CTP is used instead of MRI for initial evaluation.

Dr Andrei Alexandrov from the University of Alabama ended the first round of sessions with "TCD & Sonothrombolysis." He began with explaining how Sonothrombolysis works and then went on to discuss the CLOTBUST trial, TUCSON, and CLOTBUSTER phase 3 trial. He showed the new CLOTBUST hands free TCD system which would make

the use of Sonothrombolysis applicable to many centers despite not having a technologist 24 hours a day by training other staff such as nurses to apply the head set. He showed the meta analysis done by Dr Tsivgoulis et al in Stroke, 2010 demonstrating the benefits of enhanced thrombolysis with ultrasonography. He ended the session by giving information about CLOTBUSTER which will be a phase 3, multi-national, randomized trial with inclusion criteria of patients with NIHSS > 10 and non-contrast head CT.

The next block of sessions were by Dr Nils Mueller, Delray Medical Center, and Dr Andrew Xavier, Wayne State, who discussed their experience with telestroke networks to increase the number of patients that could potentially benefit from acute endovascular treatment. Dr Mueller looked at it from a private practice point of view and Dr Xavier from an academic center point of view. Dr Mueller discussed the "Business" benefits of telestroke by keeping ineligible patients at the local hospital, non-stroke transfers down, and access to patients that can really benefit. He also mentioned that despite tPA use increasing, 62% of primary stroke centers did not administer any tPA and telestroke might help with making these hospitals more comfortable with giving tPA in a potential drip and ship situation.

Dr Xavier then added that having an academic tele-stroke hub can be beneficial for many reasons including having more staff to share call (as opposed to private practice), opportunity for patients to be in trials, and teaching/training of hospitals and ER physicians of the latest stroke treatments. He then mentioned his experience at Wayne state which lead to increased clinical volume, increased endovascular volume, decreased door to needle average time, and increased research enrollment.

## SVIN 4TH ANNUAL MEETING (continued)

The early afternoon session addressed Recent Trials and Novel Treatment Technologies in Acute Ischemic Strokes. The first of these sessions was on DEFUSE 2. Dr Albers revealed that the data, although not coming out until the International Stroke Conference (ISC), showed time sometimes does not matter and imaging is very powerful in finding patients that might benefit outside the time window. Lessons learned so far were automated CTP is promising, time is brain but every stroke is not the same, some > 80 years old, > 20 NIHSS patients can do well, DWI reversal is not clinically relevant, Tmax 6 is a very good surrogate for critical hypo-perfusion, reperfusion trumps recanalization (ie moving clot from M1 into M2 or M3 without reperfusion doesn't affect outcome), and reperfusion of dead brain is of no benefit to patients.

Dr Jeff Saver, UCLA, discussed the large artery subgroup of the SENTIS trial which looked at the NeuroFlo cerebral perfusion augmentation device for strokes that are not tPA or Endovascular candidates. SENTIS study design was randomized 1:1 with primary endpoints being NINDS global score, inclusion criteria was < 1/3 MCA, NIHSS 5-18; exclusions were cardiac or renal dysfunction, IV tpa, or IA intervention. The total number was 475 patients and the primary end points did not reach their goals. Dr Saver looked at the large artery occlusions subgroup (N=264 with NIHSS > 10) and showed clinical benefit with improvement in mRS in the control group vs placebo group.

Dr Jordi Blasco from Spain, discussed the European experience with the Stentriever in acute ischemic stroke. He primarily discussed the experience with the Trevo device. There were a total of 60 patients treated up to 4 1/2 hrs. Recanalization was excellent with 90% of anterior circulation (72% were M1 occlusion)

TIMI 2b or greater with TIMI 2 and 3 being 87% and 96% respectively.

Lastly Dr Saver returned to discuss the SWIFT trial, which is comparing MERCI vs Solitaire for recanalization. The Solitaire is a self expandable stent retrievable device for extraction of acute ischemic stroke clots. He discussed the inclusion criteria and end points and mentioned that the trial was stopped early in February but did not discuss any of the interim data which will be presented at the ISC 2012 conference.

Session 4 and 5 were oral abstracts and Session 6 ended the scientific sessions for the day with Intracranial atherosclerotic disease (ICAD). The first speaker was Dr Raul Nogueira, of Emory, who gave an introduction and pathophysiology of ICAD. He provided four mechanisms by which ICAD may cause strokes: thrombotic, thromboembolic, hypoperfusion, and lacunar(perforator) strokes. He then mentioned three ways to combat ICAD including: thrombus prevention, plaque modification (statins), and plaque remodeling (PTAS). He also mentioned that in assessing ICAD, it is important to realize that collaterals are a big predictor of ICAD as indicated by Liebeskind et al in Annals of Neurology March 17, 2011. He then raised the question whether we are selecting the correct patients? For example, are we treating stable angina, as in the cardiology world, which has been shown not to benefit from endovascular treatment by the COURAGE trial.

The next speaker was Dr David Liebeskind from UCLA. He lectured about the impact of collateral flow in ICAD. He discussed advantages of using collateral / perfusion angiography over CT/MRI PWI including: identification of arterial inflow and venous outflow

## SVIN 4TH ANNUAL MEETING (continued)

routes, known signal intensity versus contrast concentration, absence of recirculation effects, higher resolution, multiplanar projections, contemporaneous with endovascular procedure, and no additional contrast or radiation exposure.

The next two lectures dealt with selection and techniques of intracranial stenting. The first lecture was “Ballon Mounted vs Self Expanding Stents” by Dr. Rishi Gupta, from Emory. Dr. Gupta summarized results of several studies and came to the conclusion that Ballon Expandable Stents (BES) and Self Expandable Stents (SES) have similar peri-procedural risk but BES have less in stent restenosis while SES have lower technical failure rate. He also mentioned the current ongoing VISSIT trail which is a RCT comparing BES (Pharos) to medical therapy. Dr Chaloupka discussed the technical pitfalls of intracranial stenting for ICAD.

Lastly Dr David Fiorella, went over the SAMMPRIS trial and all its criticisms. He did an excellent job going over each criticism point by point. Criticism # 1, “aggressive medical therapy is not real world.” He showed that the



*Dr. Isil Saatci teaching at the Pipeline course.*

medical therapy was easy and had adjustments every 30 days and that the lifestyle modification program only costs \$400 for the entire year which is much cheaper than endovascular treatment. Criticism # 2, patients enrolled were lower risk patients. This was doubtful as every site was encouraged to enroll everyone. He also pointed out that the Wingspan NIH and Multicenter registry had stroke or death rates of 14 % on average within 6 months. Criticism # 3, general anesthesia contributed to high event rate. He emphasized there is no good data to support this and the only randomized of general vs local anesthesia trial for endarterectomy showed no difference, GALA in Lancet 2008; 372:2132-42. Criticism # 4, results don't apply to my site. He showed as did the paper that even the highest enrolling and most experienced sites, had high event rates and that the investigators had a vested interest in the trial working but they don't judge outcome events as objectively as a blinded adjudicator. Criticism # 5, results don't apply to patients who have failed medical therapy. He showed that 63% of patients had TIA or Stroke on anti-thrombotic therapy before enrollment. Criticism # 6, if platelet function testing were used the complications in the stenting



*Drs. Vallabh Janardhan and John Chaloupka practice deployment of a Pipeline stent at the hands-on session of the Pipeline course.*

## SVIN 4TH ANNUAL MEETING (continued)

arm would have been lower. He showed that the complications were both ischemic and hemorrhagic, there is no evidence that platelet function testing is standard of care, and that the largest PFT-guided coronary intervention trial (GRAVITAS) showed no impact of re-loading and increasing the maintenance dose of clopidogrel in “resistant patients” prior to intervention.

Overall, the meeting first day of scientific sessions was very intense with great insight from all the speakers.



*Dr. Tibor Becske proctors in-vitro pipeline deployment to Drs. Nirav Vora and Johanna Fifi.*

## SAVE THE DATE



## 5th Annual Meeting



**October 27-28, 2012**

**Fontainebleau Hotel • Miami Beach, Florida**

For More Information Please Visit [www.svin.org](http://www.svin.org)

# SVIN 4TH ANNUAL MEETING: ABSTRACTS HIGHLIGHTS

## ALIREZA NOORIAN, MD

The fourth annual meeting of the Society of Vascular and Interventional Neurology was held in October 2011 at the Westin Diplomat Resort in Hollywood, Florida. It provided two days of educational sessions focusing on the most up-to-date advancements and controversial issues in cerebrovascular diseases managed by neuroendovascular intervention.

In the abstracts session, a total of 78 abstracts were submitted. This was a 28% increase compared to the last meeting in 2010. Sixty seven abstracts were accepted and featured in the posters session. There was a growth in the variety of subjects in the field compared to previous years ranging from basic science and animal models of stroke to clinical trials.

Yavagal D et al from University of Miami Miller School of Medicine presented a reversible middle cerebral artery (MCA) occlusion stroke survival model in dogs. In this model, 28 dogs underwent MCA occlusion which was achieved by a single soft platinum detachable aneurysm embolization coil for 1-3 hours. MCA reperfusion was established by coil retraction and the dogs were recovered and survived (mortality 35.7%). Successful MCA occlusion with reperfusion was achieved in 92.8% of the dogs. MCA territory infarction was seen in 100% of cases that had successful MCA occlusion.

The Interventional Management of Stroke III (IMS-III) Study investigators provided a poster to report the progress of the trial. The study is a multi-national, multi-center randomized open-label clinical trial to compare the safety and efficacy of combined IV/ IA tPA to standard IV tPA in moderate to large strokes (NIHSS $\geq$ 10 or 7 $\leq$ NIHSS $<$ 10 with large vessel

occlusion (MCA, ICA or basilar), initiated in the first three hours of symptom onset. Efficacy measures include modified Rankin Scale of 0-2 at 3 months (primary), NIHSS, Barthel Index, EuroQol EQ-5D (secondary) at 3 months. Safety measures include mortality at 3 months (primary) and incidence of parenchymal hemorrhage type 2 (PH2) and any asymptomatic intracranial hemorrhage (secondary). As of Sep 27th, 2011, they have enrolled 553 patients (goal of 900) from 46 enrolling sites.

Aghaebrahim AN et al, presented their work on Manual Aspiration Technique (MAT), which has been used in acute coronary artery syndromes, with little experience in acute stroke. They measure clinical outcomes and safety measures when MAT is used in conjunction with other thrombolytic modalities. In review of 191 patients, successful recanalization rate was 93%, with favorable outcome (defined as mRS $\leq$ 2) of 55%. There was a 13.6% rate of parenchymal hematoma (PH1, PH2), 2.3% perforation and 90-day mortality of 25%. They concluded that MAT, when used as part of multimodal recanalization strategies, has high recanalization rate, short treatment times and good clinical outcomes. This abstract, presented by Dr. Nima Aghaebrahim, PGY3 Neurology resident in University of Pittsburgh, was awarded the best abstract presentation. Congratulations Nima!

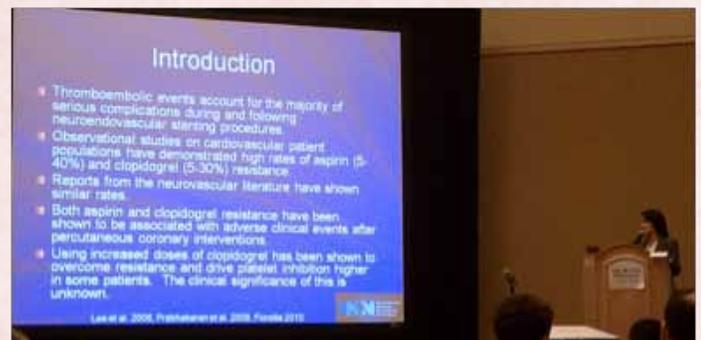
Mendonca N et al, from Vall d'Hebron University Hospital in Barcelona, Spain and University Hospital of Coimbra in Coimbra, Portugal did a head-to-head comparison between Trevo and Solitaire retrievable stents in 33 consecutive patients (13 treated with Trevo and 20 with Solitaire, with similar clinical characteristics). Successful revascularization (TICI 2a-3) was achieved in 77% in the Trevo group

# SVIN 4TH ANNUAL MEETING: ABSTRACTS HIGHLIGHTS (continued)

vs 60% Solitaire, ( $p=0.45$ ). No symptomatic intracranial hemorrhage was observed in the Trevo group compared to 15% with Solitaire ( $p=0.26$ ). Good outcome (mRS 0-2 at 3 months) was 38% and 40%, respectively ( $p=0.43$ ).

Fifi JT et al, St. Luke's Roosevelt Hospital presented their work on the relationship between the anti-platelet drug, Clopidogrel resistance and neurovascular stenting complications. Clopidogrel resistance was measured using VerifyNow point-of-care platelet function assay and resistance was defined as less than 20% inhibition. Out of a total of 96 patients, 5.2% and 36.5% were found to be Aspirin and Clopidogrel resistant, respectively. Seven patients (7.3%) developed thromboembolic events within 30 days after the procedure. (6/7 Clopidogrel resistant) Therefore, Clopidogrel resistance was associated with higher risk of thromboembolic events. In the logistic regression model, they found that in addition to Clopidogrel resistance, higher diastolic blood pressure and lack of statin use were also associated with thromboembolic complication.

Mendonca N et al, from Vall d'Hebron University Hospital in Barcelona, Spain and University Hospital of Coimbra in Coimbra, Portugal presented their work about arterial blood gas analysis of samples directly obtained from post-occlusion site (post-occ) and compared it to the sample taken from the carotid artery (pre-occlusion). They demonstrated that in 16 patients with large vessel occlusions, there was a significant difference between pre- and post-occ mean oxygen partial pressure (PaO<sub>2</sub>) ( $78.9 \pm 16.3$  vs  $73.9 \pm 14.9$ ,  $p < 0.001$ ), and mean oxygen saturation (SatO<sub>2</sub>) ( $94.3\% \pm 3.9\%$  vs  $93.2\% \pm 4.4\%$ ,  $p < 0.001$ ). They also showed that patients with Post-Occ PaO<sub>2</sub> > 70 mmHg and Post-occ SatO<sub>2</sub> > 92% had higher chances of clinical improvement.



*Dr. Johanna Fifi presents her research on antiplatelet assays in neurointerventional work as correlated with thromboembolic events.*



*Congratulations to Dr. Yogesh Moradia for best abstract at the 4th Annual SVIN meeting, presented by Drs. Italo Linfante and Raul Nogueira.*



*Best resident abstract awarded to Dr. Nima Aghaebrahim as presented by Drs. Tudor Jovin, Raul Nogueira, and Italo Linfante.*

# SVIN 4TH ANNUAL FELLOWS MEETING WHAT NEXT?

**KARTHIKEYAN ARCOT, MD**

## **The Question**

It was that time of the year... fellows paying attention to the emails from the recruiters. I wasn't looking for a job but was curious about the process, so I struck up conversations with a few attending physicians.

Me: "Any thoughts on what I should do when I look for a job?"

Attending 1: "You must negotiate."

Me: "Negotiate what?"

Attending 1: "Everything..."

I did my Indian head nod/bob and proceeded to ask another attending.

Me: "Any thoughts on what I should do when I look for a job?"

Attending 2: "You must negotiate."

Me: "Negotiate what?"

Attending 2: "Everything..."

After a few more experienced physicians followed the same script, I convinced myself that there was some meaning in their statements that I completely missed.

## **The Discussion**

At the SVIN Fellows' meeting in Hollywood Florida, the small conference room was packed. In the mix were senior and junior interventional fellows, stroke fellows, critical care fellows and residents, an eclectic collection with a singular purpose. The nervous energy that permeated the room was palpable but what transfixed potential interventional neurologists was not cutting edge science or the latest technological innovation but the relevance of the talk.

Dr. Narayanan began her presentation and



*SVIN 4th Annual Meeting: Dr. Sandra Narayanan offers fellowship and job advice for prospective interventional neurology fellows*

what followed was a narrative on the subtleties of finding a job. It began with the basics and then proceeded to span the spectrum of issues that pertained to finding a job and keeping it. Dr. Narayanan covered resources for finding jobs, interviews, contracts, practice models, billing basics and lifestyles.

In the midst of it all I found enlightenment regarding negotiation. It quickly became clear that negotiation pertains to more than just salary! Dr. Narayanan detailed the various aspects that needed to be negotiated: titles, appointments, equipment and supplies, staff, vacation, RVU's, call, bonuses, moving expenses, academic obligations and most importantly office space.

The best was saved for the last when she alluded to the fact that politics exists and revealed a few simple strategies to help trainees navigate the real world.

A flurry of questions followed which Dr. Narayanan answered. After the talk, the room was humming harder and the ceiling flew away with the laudation that this remarkable talk deserved.

# SOCIETY OF NEUROINTERVENTIONAL SURGERY 2011 FELLOWS CONFERENCE

## NICHOLAS TARLOV, MD

Colorado Springs - The 2011 second annual Society for Neurointerventional Surgery (SNIS) Fellows Conference in Colorado Springs was attended by more than 30 fellows and prospective fellows and featured approximately 11 lectures as well as the opportunity to deploy stents, and coil aneurysms in flow models and computerized simulators. The first half of the day was devoted to topics such as building a stroke center and neurointerventional practice, and how to bill for neurointerventional procedures in a way that maximizes the hospital's income. Dr. Italo Linfante of Miami discussed angioplasty for the treatment of vasospasm and intracranial atherosclerosis. Dr. Mary Jensen, an interventionist from the University of Virginia gave a particularly helpful talk about intra-procedural management of neurointerventional complications. She discussed what to do if a coil mass falls out of an aneurysm during coiling, and how to medically treat a patient with a loop of coils protruding into the parent artery.

Dr. Cameron Mcdougall from the Barrow Institute discussed strategies for the treatment of dural AV fistulas. He also made important points about how to distinguish between a dural AV fistula and an AVM on an angiogram: the lack of a nidus, supply only from dural arteries, and extension through the subdural and epidural space are imaging features consistent with dural AVFs. Dr. Shay Moskowitz, a neurosurgeon from the Cleveland Clinic gave a comprehensive overview of the treatment of AVMs, including surgery, embolization, and



radiation. A range of opinions were given by faculty about the use of 8F and 9F guide catheters to arrest forward flow during the treatment of acute stroke and about carotid stenting for acute ischemic stroke. One of the strengths of the course was that it exposed fellows to discussion among more than ten neurointerventional faculty about the differences in techniques for the treatment of stroke at different neurointerventional centers.

A hands on course proctored by neurointerventional faculty and industry representatives during the second half of the day helped to reinforce knowledge of the deployment of a variety of intracranial stents for coil embolization and for the treatment of intracranial atherosclerosis. Fellows were also given the opportunity to prepare and deploy liquid embolic agents and use a variety of guide catheters and microcatheters. The hands on portion of the course was improved from the 2010 version of the course by allowing fellows to roam more freely between work stations in order to focus on topics that needed more intensive review (for example, the author sought more review of the deployment of stents). Each station usually had between zero and three rotating fellows, which allowed enough opportunity for each fellow to manipulate the catheters and other products.

The fellows have created an email list in order to foster further teaching from fellow to fellow. Questions about techniques in neurointerventional practice can be emailed to all for discussion. If you are a fellow, or applying for fellowship please feel free to have yourself added to the list by emailing [Tarlov@gmail.com](mailto:Tarlov@gmail.com).

Fellows Conference

# INTERVENTIONAL NEUROLOGY FELLOWSHIP – WHAT TO KNOW BEFORE ONE APPLIES

**VIKTOR SZEDER, MD, PHD  
GUILLERMO LINARES, MD  
SANTIAGO ORTEGA MD**

Applying for a subspecialty fellowship is an exciting time in a neurologist's career. The feeling of reaching "the end of the long road" of training and the thought of finally being able to do what one dreamt of for many years is elevating. The process, however, can be complex sometimes even confusing and frustrating.

Neurology Fellows in Vascular and Neurocritical care programs seeking further training in endovascular techniques face a challenging environment. Interventional Neurology, Neurointerventional Surgery, Endovascular Neurosurgery, and Interventional Neuroradiology are among the names used to describe our highly subspecialized field. This diversity in terminology is symptomatic of the occasional breakdown in communication among the three main specialties involved in the field, neurosurgery, radiology and neurology.

In our opinion, future fellows should seek to train in groups that are multidisciplinary in nature. Good mentors recognize the strengths in a diverse team and are committed to breaking down barriers created by obsolete notions. We encourage prospective fellows to seek such mentors and to value the advantages in a multidisciplinary team.

The candidate should begin searching and gathering information sooner rather than later, in general at least 1 year earlier than for



other neurological subspecialties (beginning of PGY3). This subspecialty is very competitive and a late applicant will encounter programs already filled.

The general prerequisite is completion of at least 1 year of Vascular Neurology/Stroke fellowship before Interventional Neurology. However, prior Neurocritical care experience or even a completed fellowship in Neurocritical Care is valued as strength in minds of many Interventional Neurology program directors.

Given that the fellowship programs do not participate in any match or standardized application process, finding information can be difficult. Start searching the SVIN, SNIS (Society for Neurointerventional Surgery) and AANS (American Association of Neurological Surgeons) websites. Some programs still have preferences for candidates from the other two training tracks, but we encourage applying to as many programs as one can handle. We strongly believe that a highly motivated and well-rounded neurologist can be an equal candidate to applicants from radiology or neurosurgery. The good news is that more and more programs are interested in training candidates from different training backgrounds.

In-person interviews are an unsurpassed opportunity to meet the field's leaders face to face. In this fellowship, one works daily with a small team of faculty and co-fellows, so it is very important to pay attention to the training philosophy, dynamics of the program, and working environment. All these factors can become very important in such an intense, demanding and procedural subspecialty. They should match with the candidate's personality and expectations.

We over-emphasize the importance of spending

# INTERVENTIONAL NEUROLOGY FELLOWSHIP (continued)

as much time possible during the interview day with the program's current fellows. This can be the decisive factor.

The final decision process will likely be unlike any prior matching experience for the Fellow. One may be headed to a new institution, and often will not know where even 6 months prior to the moving date. Be prepared for a prolonged process of negotiation and uncertainty. There is no match, and different institutions have different decision dates. One may find oneself in the position of deciding whether to jeopardize an already-offered position at a second- or third-choice program while waiting to hear from one's "dream" program. A standardized decision dates would smooth this process for both applicants and program directors.

In our opinion and recent experience, the best decision takes into account a combination of career and family factors. Fellows should recognize that during the training period, they

will seldom be at home, and will be called in for emergencies often. As one of the leaders of this field recently said during the interview: "We are who we are, because the help of our family love, the ones to whom we have to thank for their unconditional support and devotion".

The neurointerventional field is an amazing dynamic, evolving subspecialty of exceptional physicians who go above and beyond the expected in the care of their patients. They are driven to advance the science of this field to improve patient outcomes.

Congratulations on the decision of becoming a part of this process. Good luck! The journey ahead will be fantastic.

# PATIENT CASE: 14 YEAR OLD GIRL WITH WEAKNESS OVER FOUR YEARS

## ITALO LINFANTE, MD



A 14 year old girl presented with progressive bilateral leg weakness over four years. The patient was wheelchair bound and was also developing bilateral proximal arm weakness. She had bladder incontinence. On exam, she had a nevus on her torso, spastic paraplegia with sustained bilateral clonus. There was a T8 sensory level. MRI showed an extensive thoracic spinal AVM, also confirmed on angiography to involve the whole T8 metamere, consistent with Cobb's syndrome. The patient underwent Onyx embolization of bilateral T8 levels.

The patient made a remarkable recovery. On the day after her procedure she started to recover feeling in her legs. Two days later, she had minimal proximal movement of her legs. One month later, she was able to make steps



at the parallel bar with support. She is now able to walk without support. Her story is an inspiration and sensational, she has been featured on several news channels, including Miami CBS news, and

Cayman 27.

In 1915 Stanley Cobb described one case of “hemangiomata” of the spine associated with a skin nevi (Cobb S. Hemangioma of the Spinal Cord: associated with skin nevi of the same metamere. *Ann Surgery* 1915;62:641-9). The diagnosis was made after laminectomy with dural exposure: “visualization of tense, bulging vessels in the spinal canal”. It is unclear if the lesion described was a spinal AVM or a complex dural fistula. Several reports followed, with indiscriminate use of the syndrome because of the absence of angiographic description of the vascular lesion. In 2009,

Kim et al described Cobb syndrome as extradural and intradural AVM, which involved bone, muscle, skin, spinal cord and nerve roots. The number of documented cases of Cobb's syndrome in the literature is approximately 40; this angioma is found most frequently in the thoracic spine.

“[The patient's mother] can't find the words to express her gratitude to the team of doctors at Baptist Hospital. She is thrilled to see her daughter, although small steps, walking.”

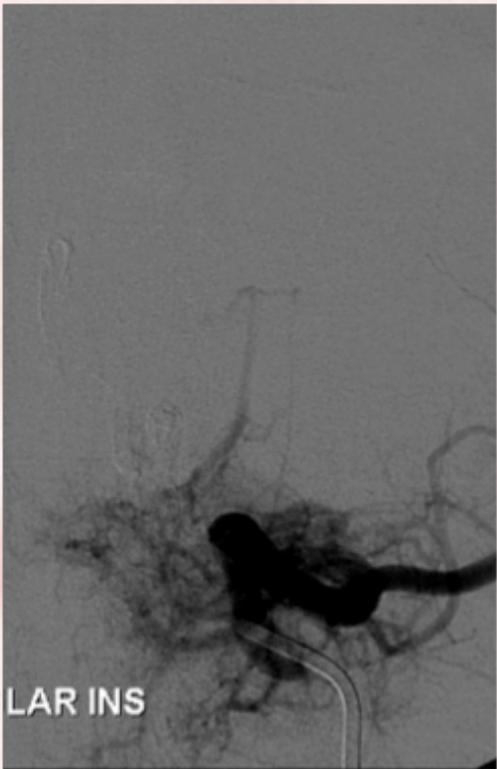
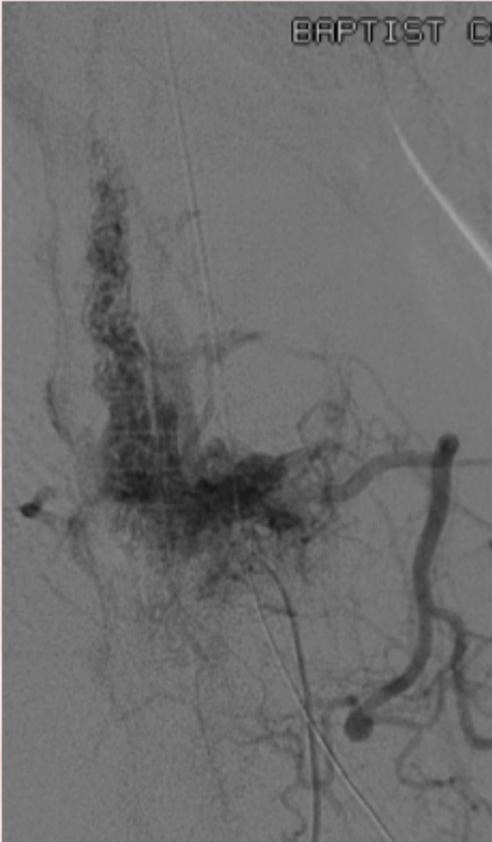
-CBS Miami News

For more information, please see: <http://miami.cbslocal.com/2011/01/26/daring-procedure-allows-bolivian-girl-to-walk>.



Patient Case

# PATIENT CASE (continued)



**VIKTOR SZEDER MD,  
PHD, MSC**



**1. Does treatment of ruptured intracranial aneurysms within 24 hours improve clinical outcome?**

*Phillips TJ, Dowling RJ, Yan B, Laidlaw JD, Mitchell PJ. Stroke 2011; 42:1936-1945.*

**Summary:** The authors of this paper evaluated clinical outcome in SAH patients comparing ultra-early (<24hr) vs. delayed (>24 hr) aneurysm treatment. They used retrospective analysis of their single institution database of consecutive ruptured aneurysms treated with coiling or clipping (1997-2007). The primary outcome measure was mRS at 6 months. Despite their policy of treating all cases ultra-early (n=230), 50% were treated >24 hr (n=229) which they attributed to nonclinical logistic factors (i.e. transfers from other hospitals or delays with anesthesia for low WFNS cases). At baseline, there were more WFNS grades 4-5 and Fisher 3-4 and coilings (61% vs 39%) in the ultra-early group. The results showed 8% of patients had unfavorable outcome (mRS 3-6) in the ultra-early group vs 14.4% in the delayed group (RRR 44%, ARR 6.4%). In the subgroup of patients who were coiled, only 3.5% had mRS 3-6 in the ultra-early group vs. 12.5% in the delayed group (RRR 82%, ARR 10.2%).

Authors concluded that securing the ruptured aneurysm within 24 hrs is associated with improved clinical outcome at 6 months, when compared to treatment beyond 24hrs. This benefit was even more pronounced in patients who were coiled then clipped. (What accounts for this improved outcome for early treatment (or why did patients not do as well if treated later)? This is important to extract from the author's review of their data)

**Commentary:** This question remains clinically relevant; given the risk of severe mortality of 60-80% in the aneurysm rebleeds while waiting for coiling or clipping.

The generally accepted treatment timing of securing a ruptured aneurysm is 24-72hrs, even though more centers are working towards achieving this goal <24h. There are cases, however, and not insignificant in numbers (50% in this study), where from a variety of logistical reasons, patients don't get to surgery early. This very nice retrospective analysis shows clear association of ultra-early treatment, more so for coiling, with improved clinical outcome.

The strength of the study is a large dataset spanning 11 years with 6 months follow-up.

It is likely that the data could be even more convincing for the coiling group if analyzed since 2002, given the current practice of preferred coiling in post-ISAT era. The authors comment that the proportion of endovascular coiling increased from 20% to 59% after 2002 in their institution.

The limitations of the study are associated with the single institution retrospective analysis design. In addition, we note that patients who died within 24 hrs were excluded and 104 were lost to follow up and thus excluded from the analysis.

In the discussion authors touch briefly on the possible reasons for the improved outcome of ultra-early coiled patients. One being avoiding the need for surgical retraction related intraoperative injury when patients are coiled. This could be debated. It would have been helpful to support this with presenting intraoperative findings of clipped patients.

Overall, this study is another strong argument of accepting clinical pathways and hospital policies of mobilizing the interventional/surgical/anesthesia teams to execute securing ruptured aneurysms within 24 hours.

Journal Watch

# JOURNAL WATCH FOR THE CORE (continued)

## Commentary (cont.)

The bigger problem remains in the logistics of when the patient with aneurysmal SAH is brought to a small hospital and needs to be transferred to a hospital providing higher level of care.

High volume specialized centers with comprehensive multidisciplinary teams of Neurointensivists, Neurosurgeons and Neurointerventionalist with abilities of providing specialized critical care and the expertise of securing the ruptured aneurysm within 24 hours should be preferred in the care of these patients.

### **2. Imaging-Based Endovascular Therapy for Acute Ischemic Stroke due to Proximal Intracranial Anterior Circulation Occlusion Treated Beyond 8 Hours From Time Last Seen Well: Retrospective Multicenter Analysis of 237 Consecutive Patients.**

*Jovin TG, Liebeskind DS, Gupta R, Rymer M, Rai A, Zaidat OO, Abou-Chebl A, Baxter B, Levy EI, Barreto A, Nogueira RG. Stroke 2011; 42:2206-2211.*

**Summary:** This paper is another important piece in the puzzle of patient selection for endovascular therapy for acute stroke based on assessment of salvageable tissue, rather than based on time.

They present a retrospective analysis of data from 11 US institutions of prospectively collected data on acute ischemic stroke patients. The population of patients studied met inclusion criteria of having an acute proximal intracranial anterior circulation occlusion, endovascular treatment initiated >8 hours from time last seen well and the treatment selection based on MRI (26% of patients) or CT perfusion (61%) imaging. The primary aim was assessment of safety, technical and clinical outcomes.

There were 237 patients included (mean age 63.8, NIHSS 15, last time seen well 15 hrs). MRP was used in 26% of patients; CTP used

in 61%, both CTP&MRI in 13% as imaging selection. In 16% of patients the modality could not be determined.

Successful revascularization (TICI or TIMI >2) was achieved in 74% of patients. 9% of patients had parenchymal hematoma (PH1+PH2) post intervention and the 90-day mortality was 22%. 45% of patients had good outcome (mRS  $\leq$ 2) at 90-days or at hospital discharge.

Authors also performed multivariate analysis showing age, admission NIHSS and successful revascularization as independent predictors of good outcome. The independent predictors of mortality were unsuccessful revascularization, age, presence of ICA terminus occlusion and post interventional ICH complication.

They concluded that neuroimaging based patient selection (>8hr from the time last seen well) for endovascular therapy is safe. Successful revascularization is an independent predictor of good outcome.

**Commentary:** The authors should be congratulated for this work. They were able to provide excellent analysis of pooled data from high volume, very established stroke centers across the country.

The results are important, demonstrating acceptable safety of this approach for acute endovascular intervention patient selection. The significant predictors from multivariate analysis also confirm the results from published literature.

However, in addition to the natural components of the retrospective study design, the limitations include: lack of independent/blinded review of the angiographic images and outcome assessments, lack of imaging data on 16% of patients, and no standardized imaging protocols in the triage of patients.

One main unanswered issue is the lack of standardization of the imaging protocols. This must be established before prospective trials can be conducted.

# JOURNAL WATCH FOR THE CORE (continued)

## Commentary (cont.)

Despite growing physiological evidence and physicians' belief in imaging mismatch based patient selection, previous RCTs failed to validate this. The results of this study are encouraging and call for a prospective, blinded, randomized, controlled trial to prove that imaging mismatch patient selection for endovascular therapy can improve clinical outcomes when compared to best medical therapy alone.

### 3. Short- and Intermediate-Term Angiographic and Clinical Outcomes of Patients with Various Grades of Coil Protrusions Following Embolization of Intracranial Aneurysms.

*Abdihalim M, Kim SH, Maud A, Suri MF, Tariq N, Qureshi AI. AJNR Am J Neuroradiol 2011; 32:1392-1398.*

**Summary:** Approximately 2.5%-28% of patients may develop thromboembolic complications with coil protrusion into the parent lumen during endovascular treatment.

The angiographic and clinical outcomes are not clearly defined when these patients are managed medically or with additional endovascular treatments.

The authors retrospectively selected these patients (n=19, 7%; out of 256) from 3 centers for analysis and divided them into 3 grades. Grade 1 (n=9) being a single loop or coil protruding into the parent vessel lumen less than half the parent artery diameter; grades 2 (n=4) and 3 (n=6) were assigned when a single coil or loop protruded more than half the parent artery diameter, respectively. In 18 patients (out of the 19) the indication for aneurysm coiling was acute SAH. There were 6 patients with residual protrusion and active hemodynamic compromise. These patients were treated with intracranial stent and were placed on dual antiplatelet therapy (aspirin and clopidogrel). The remainder of the patients were treated with aspirin indefinitely. Complete aneurysm obliteration was

obtained in 16 patients. There were 4 deaths, unrelated to coil protrusion (due to vasospasm, in different vascular territories).

The authors concluded that they were able to prevent parent vessel thrombosis related to coil protrusion using antiplatelet therapy and stent placement (the latter in selected cases).

**Commentary:** The authors present an interesting case series with their management method of treating coil protrusion into the parent artery during and after endovascular coil embolization of intracranial aneurysms. They performed meticulous clinical and radiological review of their cases.

Their report is a very useful addition to the literature mainly given their detailed description of the cases and their complications. Several interesting issues deserve comment:

There were 2 (10.5%) intraoperative aneurysm ruptures, which is higher than the 1.4%–2.6% reported in large series. Given the small number of cases, it is difficult to conclude on reasons for the rupture. The authors speculated whether the coil prolapse could be associated with increased aneurysm vulnerability and consequent rupture.

One should remember that the authors used predominantly bare platinum coils. These coils might have lower rate of thromboembolic rates than bioactive coils. Also given the fortunately low rate of the coil protrusion and even lower rate of its complications, it does not allow more elaborate statistical analysis.

However, this paper provides helpful information obtained from experienced centers on applicable strategy (“cookbook”) for these scenarios. It is based on a novel anatomical grading system for coil protrusion to the parent artery. The management flowchart is available in the On-line Figure. It will be interesting to see how this strategy tested prospectively will perform compared to other management methods.

# FIRST INTERNATIONAL CONGRESS OF INTERVENTIONAL NEUROLOGY

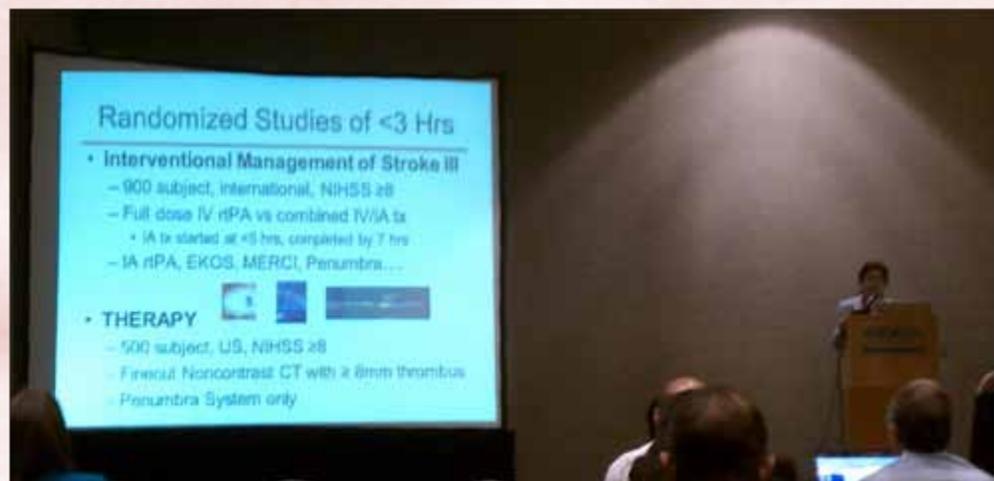
**OCTOBER 6-8, 2011**

**Minneapolis, MN** - The first International Congress of Interventional Neurology Meeting was inaugurated in Minneapolis on October 6-8, 2011 at the Minneapolis Convention Center, hosted by President of the meeting, Dr. Adnan Qureshi. There were over 100 attendees at this meeting. The meeting provided a forum for vascular and interventional neurologists, interventional neuroradiologists, and endovascular neurosurgeons worldwide to share their experiences and scientific endeavours.

Dr. Reha Tolun, who was trained by Professor Jean Jacques Merland, became the first interventional neurologist in Turkey, practicing since the 1980s. He shared his experience of building a neurointerventional and stroke service in Istanbul, Turkey. Dr. Mazighi, an interventional neurologist from France, spoke about his results from the RECANALISE trial, recently published in *The Lancet* 2009. Dr. Shakir Hussain, trained by Professor Valavanis presented use of carotid stenting in India. Dr. Jose Manterola, trained by Dr. Pedro Lylyk and Dr. Vinuela, currently practicing in Santiago, Chile, since 2008, was also in attendance.

Approximately 50 oral abstracts were presented. Principal investigators presented their respective trials: Dr. J.P Mohr provided an update on the ARUBA trial, citing that 158 patients have been recruited, a significant proportion of these patients originating from Europe. Dr. Pooja Khatri presented the IMS III trial, and noted changes that have occurred within this IV/IA bridging study; the dose of IV tPA within the first 3 hours has been increased to 0.9 mg/kg (from 0.6mg/kg). The new stentrievers have also been added as another device approved for retrieval within the study.

Of the oral abstracts of interest, Dr. Mikayel Grigoryan, senior interventional neurology fellow at the University of Minnesota, looked at the Nationwide Hospital database and found that most centers do not meet Comprehensive stroke center metrics volume of cases in categories such as carotid artery stenting, intracranial stenting, leading one to consider that these criteria should be revised, or whether regionalizing care should be set up to concentrate neurointerventional expertise in existing centers.



*International Congress of Interventional Neurology: Dr. Pooja Khatri presents the IMS III trial in Minneapolis*

# AAN 2011 SUMMARY: ABSTRACT REVIEW

## AMIT KANSARA, MD KAIZ ASIF, MD



The American Academy of Neurology Meeting was held in Hawaii, Honolulu April 2011 of this year. In this review, the authors review several interventional abstracts presented at this meeting.

### **Trends in the Treatment of Cerebral Aneurysms in the United States: Ten Years of Data**

*Elizabeth B. Claus, New Haven, CT, Ning Lin, Boston, MA*

Authors studied the rate of use of endovascular coiling and neurosurgical clipping for ruptured and unruptured aneurysms before and after publication of ISAT. There were 34,899 hospital discharges with a diagnosis of either ruptured or unruptured cerebral aneurysm from 1998-2007 identified from the Nationwide Inpatient Sample database. The use of coiling increased significantly for both groups ( $p < 0.01$ ) with coiling used in the majority (72%) of ruptured aneurysms. Although the majority of unruptured aneurysms are still treated with clipping, the relative difference in use by treatment group decreased over time.

### **Acute Stent Assisted Coiling Is Safe in Aneurysmal Subarachnoid Hemorrhage**

*Aamir Badruddin, Chicago, IL, Muhammad Taqi, Memphis, TN, Kaiz Asif, Khaled Asi, Osama Zaidat, Brian-Fred Fitzsimmons, Milwaukee, WI*

The authors studied acute thrombo-embolic complications in patients who underwent stent-assisted coiling of cerebral aneurysm after acute aSAH. This was a retrospective review including a total of 25 stents deployed. In stent

thrombosis occurred in 3 patients (12%). All three patients were treated with abciximab with one requiring penumbra aspiration. Thrombus at the neck of the coil mass occurred in 2 patients (8%), both of whom were treated with abciximab. All had complete resolution with no thromboembolic complications. Acute stent-assisted coiling was observed to be safe.

### **Successful Endovascular Acute Stroke Intervention Prevents Infarct Core Growth**

*Vincent Truong, Rori Spray, Louisville, KY, Kerri Rimmel, Simpsonville, KY, Alex Abou-Chebl, Louisville, KY*

The authors identified consecutive patients with anterior circulation strokes during a 2 year period treated with endovascular therapy (ET) and had interpretable CTP and 24-48hour CT. Only patients with CBF lesion 20% > CBV lesion and ischemic core (CBV < 50% of normal side) < 1/3 MCA territory were offered ET. ABC/2 volume calculation was obtained from CBV slices and compared with the corresponding follow-up CT slices showing the final infarct. Twenty patients were identified with mean NIHSS of 18+4 who received endovascular embolectomy in addition to IV-tPA in 5(20%) or IA-tPA and/or GPIIb/IIIa antagonist in 8(40%) patients. 14 patients (70%) had recanalization (TIMI 2-3) and 6(30%) did not recanalize (TIMI 0-1). No statistically significant infarct growth existed in patients with recanalization (13.5 8.5cm<sup>3</sup> CBV vs. 11.4 8.1cm<sup>3</sup> CT,  $p=0.54$ ). In patients without recanalization, there was a significant increase in final infarct volume (15 5.73cm<sup>3</sup> vs. 28.4 10.3cm<sup>3</sup>,  $p=0.034$ ), which was similar to initial CBF volume (21.7 8.7cm<sup>3</sup> vs. 28.4 10.3cm<sup>3</sup>,  $p=0.30$ ). They concluded that successful ET was associated with tissue salvage. CTP can be used to predict the final infarct size and may be helpful in therapeutic decision making. These results need to be validated in future studies.

Abstract Review

# ABSTRACT REVIEW (continued)

## **Long-Term Clinical and Angiographic Outcomes in Patients with Cervico-Cranial Dissections Treated with Stent Placement A Meta Analysis of Case Series**

*Fotis Souslian, Ameer E. Hassan, Haralabos Zacharatos, Gabriela Vazquez, Daniel Z. Farishita, Minneapolis, MN, M. Fareed K. Suri, Blaine, MN, Adnan I. Qureshi, Minneapolis, MN*

Five case series were reviewed in this study. 62 patients (mean age, 49+15 yrs) were treated with stent placement for dissection; 33 spontaneous, 21 traumatic, and 8 iatrogenic. Post-procedure complication rate was 7 (8.1%) including 3 pseudoaneurysm/vasospasm, and 2 TIA. Follow-up complication rate was 6 (9.7%), including 4 (6.5%) TIA, 1 (1.6%) ischemic stroke, and 1 (1.6%) unrelated death. In this series, a low rate of new TIA, ischemic stroke or death was observed in patients with cranio-cervical dissections treated with stent placement; with resolution of angiographic abnormalities during long-term follow-up.

## **Safety of Carotid Stenting and Endarterectomy in Symptomatic and Asymptomatic Patients: Results from the Carotid Revascularization Endarterectomy vs. Stenting Trial (CREST)**

*Ariane Mackey, Quebec, QC, Canada, Frank L. Silver, Toronto, ON, Canada, Wayne M. Clark, Portland, OR, William Brooks, Lexington, KY, Carlos H. Timaran, Dallas, TX, David Chiu, Houston, TX, Larry B. Goldstein, Durham, NC, James F. Meschia, Jacksonville, FL, Robert D. Ferguson, Cleveland, OH, Wesley S. Moore, Los Angeles, CA, George Howard, Birmingham, AL, Thomas G. Brott, Jacksonville, FL*

The objective of this study was to analyze the CREST periprocedural outcomes in the context of guideline recommendations for acceptable complication rates in symptomatic and asymptomatic patients. Following CEA, the rates of stroke and death were 3.2+0.7% for

symptomatic patients (about half that reported for NASCET) and 1.4+0.5% for asymptomatic patients (about the same as reported for ACAS). For CAS, the rates of stroke and death for symptomatic patients were 6.0+0.9% (at the 6% recommended by treatment guidelines) and 2.5+0.6% for asymptomatic patients (below the 3% recommended by treatment guidelines). Stroke and death rates were below or comparable to those of previous CEA trials and were within the complication rate thresholds suggested in current guidelines for symptomatic and asymptomatic patients.

## **Hemorrhage, Recanalization, and Clinical Outcomes for Combined Intravenous and Intraarterial Thrombolysis for Acute Ischemic Stroke**

*Nazli Janjua, Emiliya Melkumova, Shamrez Akrem, Brooklyn, NY, Haitham Hussein, Minneapolis, MN, Darwin Ramirez-Abreu, Rebecca Poleshuck, Sherene McIntyre, Toby Gropen, Ximena Morales, Brooklyn, NY, Adnan Qureshi, Minneapolis, MN*

The aim of the study was to evaluate hemorrhage and outcome for combined intravenous (IV) and intra-arterial (IA) thrombolysis for acute ischemic stroke (AIS). There were 34, 29, and 14 patients in the IV-IA, IA, and IV groups studied respectively. Mean NIHSS at baseline were 18 +/- 8 (group 1), 16 +/- 7 (group 2), and 16 +/- 11 (group 3) compared with 1 week/discharge scores among survivors of 14 +/- 13, 10 +/- 9, and 12 +/- 12. There were three symptomatic hemorrhages in group 1, two in group 3, and none in group 2. Above findings did not reach statistical significance. They suggested that with combined therapies for AIS, systemic thrombolysis itself may be the highest risk for hemorrhage.

# ABSTRACT REVIEW (continued)

## **Recanalization Rates and Outcomes with Larger Diameter Thromboaspiration Catheter in Acute Stroke**

*Diogo Haussen, Mohammed Ali Aziz-Sultan, Dileep Yavagal, Miami, FL*

The authors compared recanalization rates between 2 aspiration catheter sizes- tapered aspiration catheter with a distal 0.054 (with/without 0.032) and 0.041 catheter for thrombectomy in acute stroke. Recanalization rates for 14 major-vessel occlusions were evaluated. Eight arteries were revascularized with 0.054, and six with 0.041. The primary targeted artery occlusion was recanalized on 100% of the 0.054 cases (7 M1/1 ICA) and 50% on the 0.041 (3 M1/2 ICA/1 basilar) ( $p=0.03$ ). The secondary targeted arteries were all recanalized. Good outcome (disposition to inpatient-rehabilitation or home) was observed on 4/7 patients on the 0.054 group and 4/6 on the 0.041. Authors observed that primary arteries targeted for thrombectomy were recanalized more effectively with the use of the 0.054 aspiration catheter.

## **Accuracy of the New ICD-9 Code for Drip-and-Ship Thrombolytic Treatment in Patients with Ischemic Stroke. An Analysis of Minnesota Stroke Registry**

*Silvina Tonarelli, Minneapolis, MN, James H. Peacock, St Paul, MN, Gabriela Vazquez, Michael Tibbs, Kamakshi Lakshminarayan, Albert Tsai, Adnan I. Qureshi, Minneapolis, MN*

The goal of the study was to assess the use and accuracy of the new V45.88 code for identifying ischemic stroke patients who meet the criteria for drip-and-ship using a statewide registry. A total of 85 patients received the ICD-9-CM code V45.88 among patients who were successfully cross matched in both state wide datasets. The internally validated data from the MSR (Minnesota stroke registry) demonstrated that a total of 104 patients met the

criteria for drip-and-ship. A concurrent comparison found the sensitivity of V45.88 was 82% using patient designation of drip-and-ship in the MSR as gold standard. Of the 704 total cases transferred from another hospital in each hospital-specific timeframe, only one of the non- drip-and-ship cases received the V45.88 code (99.9% specificity). The new ICD-9-CM code for drip-and-ship appears to have high specificity and sensitivity, allowing effective data collection by CMS. The efficient use of this code will aid in the decisions about future reimbursement for hospitalized stroke patients.

## **Safety and Efficacy of EKOS System and Solitaire Stent Device in Major Cerebral Artery Occlusion: A Randomized Pilot Study**

*David Skoloudik, Tana Fadrna, Vaclav Prochazka, Tomas Jonszta, Roman Herzig, Martin Roubec, Ostrava, Czech Republic*

Randomized pilot study to compare safety and efficacy of two novel recanalization methods in patients with acute ischemic stroke (AIS). Fifteen patients with AIS due to the acute occlusion of middle cerebral or basilar artery within 8 hours since stroke onset were randomized for treatment using EKOS system or Solitaire device. Time to recanalization after therapy start was significantly shorter in Subgroup 2 (81.4+19.4 vs. 45.0+22.4 min.,  $p=0.003$ ). No statistically significant differences were found between both subgroups when comparing early complete recanalizations (71.4% vs 62.5%), SICH (0% vs. 0%) and number of independent patients after 90 days (42.9% vs. 25%) ( $p>0.05$  in all cases). The EKOS system and Solitaire stent device represent promising, effective and safe devices for the treatment of AIS due to major cerebral artery occlusion.

# ABSTRACT REVIEW (continued)

## **Bridging with Neurointerventional Therapy Following Full Dose Intravenous Alteplase Is Safe in Octogenarians with Acute Ischemic Stroke**

*Ugo Paolucci, White Plains, NY, Amtul Farheen, Woodbridge, NJ, Mohammad Moussavi, Edison, NJ, Mohammed Hussain, Newbrunswick, NJ, Mohammad Ibrahim, Edison, NJ, Martin Gizzi, NJ, Jawad Kirmani, NJ*

Thirty-three consecutive acute ischemic stroke patients over the age of eighty were examined retrospectively. Twenty patients received intravenous thrombolytic therapy alone while the remainder received a combination of intravenous thrombolytic (IV) as well as endovascular therapy (IV+IA, intra-arterial thrombolytic and/or mechanical thrombectomy). The intravenous thrombolytic group had an average modified Rankin score on discharge of 5 (SD 1.4) while the intravenous thrombolytic group bridged to endovascular therapy was 4.0 (SD 1.7,  $p < 0.09$ ). The complication rates were not significantly different in two groups. Other risk factors were matched and controlled in both groups. Patient age alone should therefore not be a sole determinant in excluding such patients from consideration for endovascular therapy.

## **Endovascular Recanalization of Complete Subacute to Chronic Atherosclerotic Occlusions of Intracranial Arteries**

*Amin Aghaebrahim, Tudor Jovin, Pittsburgh, PA, Brian-Fred Fitzsimmons, Osama Zaidat, Milwaukee, WI, Rishi Gupta, Atlanta, GA, Raul Nogueira, Atlanta, GA*

This was a retrospective multicenter case series (3 academic centers from 04/05-09/10) of a total of 21 endovascular treated patients presenting with symptomatic (TIA or stroke) subacute (>48 hours) or chronic complete occlusion of an intracranial artery of presumed atherosclerotic etiology. Post-recanalization angiography

had TIC12b reperfusion in 2 cases and TIC1 3 in 19 cases. Peri-procedural complications included 1 case of reperfusion syndrome (seizures and cerebral edema), 2 dissections, and one perforation requiring coil sacrifice of the PCA. There were no peri-procedure strokes or symptomatic hemorrhages. Restenosis (>50% stenosis + >20% absolute luminal loss) occurred in 1/11 patients with CTA or conventional angiography follow-up (asymptomatic). No recurrent TIA's or strokes in the 15 patients with clinical follow-up at 90-days. At 90-days, there was one death (unrelated to the procedure) and 7/14 patients with available mRS achieved excellent outcomes (mRS 0-1). Endovascular recanalization can be performed with an acceptable safety profile in selected patients with symptomatic complete subacute to chronic intracranial atherosclerotic occlusion.

## **Stroke Type, Laterality and Severity Following Carotid Artery Stenting (CAS) and Carotid Endarterectomy (CEA) in the Carotid Revascularization Endarterectomy Versus Stenting Trial (CREST)**

*William Brooks, Lexington, KY, J. Mohr, New York, NY, Jenifer Voeks, Birmingham, AL, Wayne Clark, Portland, OR, Frank Silver, Toronto, ON, Canada, Ariane Mackey, Quebec City, QC, Canada, Michael Hill, Calgary, AB, Canada, James Meschia, Jacksonville, FL, Alice Sheffert, Newark, NJ, Thomas Brott, Jacksonville, FL*

Brooks et al described the type, laterality, and severity of the periprocedural strokes detected in CREST. Stroke was defined as an acute neurologic event with focal symptoms and signs lasting > 24 hours consistent with cerebral ischemia. Out of 2,274 symptomatic and asymptomatic patients with either CEA or CAS, 69 strokes occurred, 62 (91.7%) were ischemic, and 7 (8.3%) were hemorrhagic; 61 (88.4%) were ipsilateral, 4 were contralateral, and 4 were vertebrobasilar (5.8% each). The ischemic strokes occurred on day zero for 38 (61%).

## ABSTRACT REVIEW (continued)

Major stroke (n=13) was infrequent and did not differ by treatment received. Mortality up to 4 years was higher for patients with periprocedural stroke compared to those without (20.0% vs 11.6%; HR=2.8; 95% CI 1.56, 5.06; p=0.0006). They concluded that strokes after CAS and CEA were usually ipsilateral, minor, occurred early, and were infrequently hemorrhagic. Longer term mortality was increased. For ischemic stroke, improving safety should focus on the immediate periprocedural period.

### **Microcatheter to Recanalization (Procedural Time) Predicts Outcomes in Endovascular Treatment in Acute Ischemic Stroke Patients**

*Ameer E. Hassan, Minneapolis, MN, Jefferson T. Miley, Saint Louis Park, MN, Saqib A. Chaudhry, Gabriela Vazquez, Summer A. Hassan, Robert A. Taylor, Ramachandra Tummala, Gustavo Rodriguez, Minneapolis, MN, M. Fareed K. Suri, Blaine, MN, Adnan I. Qureshi, Minneapolis, MN*

In this study, procedural time was defined by the time interval between microcatheter placement and recanalization or completion of procedure. They estimated the procedural time after which either recanalization was unlikely or favorable clinical outcome was unlikely, even after recanalization after age and NIHSS adjustment. There were 242 patients analyzed undergoing endovascular treatment, mean age: 65.16 years. Median time to recanalization was 54 minutes [95% CI 48-60]. Longer procedural time decreased the likelihood of favorable outcome per hour [odds ratio (OR) 0.44; (95% CI: 0.24-0.82)]. With procedural time of 30 minutes, 25% (95% CI: 20-30) patients had angiographic recanalization. The procedural time where no additional benefit of endovascular therapy was observed was estimated at 32 minutes from initiation of procedure, with a favorable clinical outcome rate of 10%. They concluded that procedural time in patients undergoing endovascular treatment for acute

ischemic stroke appears to be a critical element for achieving favorable outcomes.

### **Failure of Conscious Sedation among Patients Undergoing Neuro-Endovascular Procedures**

*Rizwan Husain, Ameer E. Hassan, Gabriela Vazquez, Gustavo Rodriguez, Minneapolis, MN, M. Fareed K. Suri, Blaine, MN, Ramachandra Tummala, Robert A. Taylor, Mustapha Ezzeddine, Adnan I. Qureshi, Minneapolis, MN*

It is known that in certain patients, conscious sedation may be inadequate during the procedure and an unplanned conversion to general anesthesia may be necessary. There were 265 patients treated with conscious sedation among 1971 endovascularly treated patients. The rate of failure of conscious sedation in 265 consecutive patients (387 procedures) undergoing neuro-endovascular procedures under conscious sedation was only 2.3% (9 procedures representative of 8 patients). Favorable outcome was observed in 111 (42%) of the conscious sedation patients and 4 (50%) of the patients requiring general anesthesia. Death was seen in 46 (17%) of the conscious sedation patients versus 1 (13%) of the patients requiring general anesthesia. They concluded that there is a minimal rate of conscious sedation failure among patients undergoing neuro-endovascular procedures with minimal rates of adverse outcomes. Such observations support broader use of local anesthesia (conscious sedation) in neuro-endovascular practice.

# ABSTRACT REVIEW (continued)

## **Value of Other Mechanical Thrombectomy Techniques among Patients with MERCI Device Failure during Endovascular Treatment of Acute Ischemic Stroke**

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The goal of this study was to determine the effectiveness of additional thrombectomy techniques after failure of the MERCI device. 46 consecutive patients treated with the MERCI device were studied, with a mean age of 66.8 ± 16 years and a mean admission NIHSS score of 16.8 ± 6.7. There were 25 cases where MERCI was only used (group 1), 15 cases where MERCI failed and required another mechanical device (group 2), and 6 cases where MERCI was used after initiating the procedure with another mechanical device (group 3). Recanalization was achieved in 36 (78 %) patients when measured by TIMI. The number of passes attempted in group 1 was 1.65 passes and group 2 was 1.73 passes. The angiographic recanalization rates were 80% in both groups 1 and 2. There was no significant difference in NIHSS improvement (4 points) or discharge mRS scores. They concluded that in cases where the MERCI device is unsuccessful, additional mechanical thrombectomy can result in recanalization and provide comparable rates of favorable outcomes.

## **Growth of Regional Stroke Systems of Care in the United States in the First Decade of the 21st Century**

*Sarah Song, Jeffrey Saver, Los Angeles, CA*

In this study, the authors described the growth of regional stroke care system and coverage of US population by EMS PSC routing laws. The first counties to pass regional stroke routing regulations were in Alabama (2000), and the

first states to pass EMS PSC routing laws were Florida and Massachusetts (2004). By 2010, a total of 16 states had state-level legislation or regulations requiring EMS PSC routing, plus counties in 3 additional states. The U.S. population residing in jurisdictions with regional stroke systems of care increased substantially in the latter half of the decade: from 0.4% (2000) to 52% in mid 2010. Additional efforts are needed to extend regional stroke systems of care to the remaining U.S. population currently not assured of emergency access to best care practices.

## **Protocol Driven CT Angiography (CTA)/CT Perfusion (CTP) for Identifying Asymptomatic Cerebral Vasospasm after Aneurysmal SAH**

*Kaiz Asif, Milwaukee, WI, Muhammad Taqi, Memphis, TN, Dhruvil Pandya, Osama Zaidat, John Lynch, Brian-Fred Fitzsimmons, Milwaukee, WI*

In this study, 26 patients with aneurysmal SAH with Fisher grade 2 or higher had CTA and CTP performed on day 5 and 10. There were 14 (53.8%) patients who demonstrated vasospasm on CTA or on CTP or both. Early vasospasm (day 5) was seen in 9 (34.6%) patients and late vasospasm (day 10) was seen in 5 (19.2%) patients. Out of all 14 patients with vasospasm, 2 (14.2%) were symptomatic. 12 (85.8%) patients were found to have asymptomatic vasospasm. These patients were aggressively managed in neuro intensive care unit to maintain euvolemia. Only 1(4%) developed delayed cerebral injury (DCI) after detection of asymptomatic vasospasm. Authors concluded that large number of patients that develop asymptomatic vasospasm after aSAH can be detected prior to the development of symptomatic vasospasm or DCI by performing protocol driven CTA/CTP. Larger studies are needed in the future to determine if this would improve clinical outcome.

## ABSTRACT REVIEW (continued)

### **Expanding Endovascular Therapy of Very Small Ruptured Aneurysms with the 1.5mm Coil**

*Thanh N. Nguyen, Nick Tarlov, Chin S. Lawrence, James Holsapple, Alexander M. Norbash, Boston, MA*

In this study, the authors reviewed ruptured aneurysm cases from 2007 to August 2010 at a single center. 47 aneurysms were treated acutely with coils in 45 patients presenting with subarachnoid hemorrhage. Mean aneurysm size was 8.0 4.4mm (range 2-25mm). There were 4 patients with 3mm aneurysms, of which the transverse diameter was less than 2mm in three patients. In all four patients, a single 1.5mm coil was inserted without com-

plication. Complete occlusion was achieved in one patient, residual neck in one, and residual aneurysm filling seen in two patients. Aneurysm recanalization was present in one patient; coiling attempt was unsuccessful due to coil migration. Another patient was retreated by surgical clipping for a residual wide neck carotid terminus aneurysm. One patient died of ventriculitis 3 weeks after presentation; all three other patients had excellent outcome with no rebleed at follow-up (mean 9.3 months, range 4-14 months). They concluded that 1.5mm coil may be used with reasonable safety in the endovascular treatment of patients with very small ruptured aneurysms, providing a band-aid to the site of rupture in the acute phase.

## cPAX: A NEW DETACHABLE COIL FOR TREATMENT OF GIANT CEREBRAL ANEURYSMS

YOUSEF HANNAWI,  
MD



Large and giant cerebral aneurysms are a major source of morbidity and mortality by either rupture or compression of adjacent neurological structures.

The management options of these aneurysms include surgical clipping and endovascular therapy. In April 2011, the FDA approved a new device manufactured by NeuroVasx, Inc for the treatment of wide-neck large and giant cerebral aneurysms called NeuroVascular Embolization Device (cPAX Aneurysm Treatment System). This device was previously approved for CE Mark in March of 2009. It was then approved for a device license in Canada in August of 2009. Important features of this device, its mechanism of action, side effects and possible clinical benefits of this device are summarized in this article.

Device Description and Principles of Operation:

The NeuroVasx cerebral aneurysm treatment

device is comprised of the polymeric aneurysm filling material (cPAX) and the means to percutaneously deliver the filter material into the aneurysm. The complete cPAX system components include the polymeric filling implant material (cPAX), the D3 (delivery and detachment device), the cPAX Jumper Cable (connection between the detacher device and power supply) and the cPAX power supply (supplies energy to the detacher device to assist in the detachment process).

The overall concept of operation is similar to that of metallic coils. The cPAX utilizes a soft polymer base material rather than metallic coils. The embolization material is pushed through a microcatheter into an aneurysm and then detached in order to occlude the aneurysm by reducing the blood flow into the aneurysm. The cPAX is placed into an aneurysm in a continuous fashion until angiographic filling is achieved. It is then detached via an internal wire with a heating tip system. The cPAX remains a permanent implant within the aneurysm.

### Principles of use and contraindications:

This device is approved by the FDA for use in the adult population (22 years of age and older) for the treatment of large (>10mm), wide-necked and giant-sized cerebral aneurysms that require use of adjunctive assist-devices such as stents or balloons.

Contraindications for use of this device include active bacterial infections and patients in whom anticoagulation and antiplatelet therapy are contraindicated. The performance of this device has not been evaluated in patients with ruptured aneurysms.

### Mechanism of action

The cPAX treatment system implantable material is a shapeless hollow strand that randomly fills the cavity of an aneurysm. Platinum coils come in pre-determined two or three dimensional shapes which do not always conform

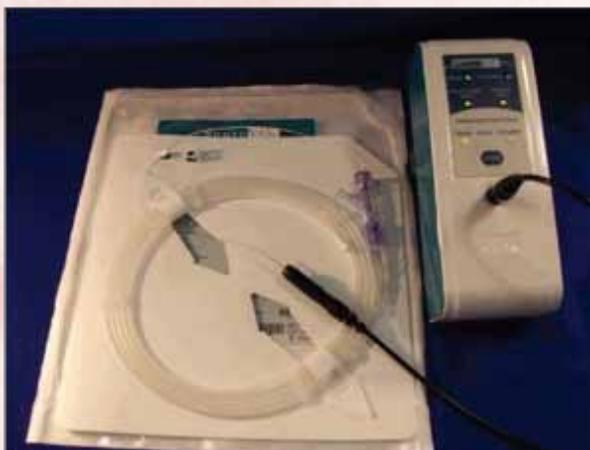


Figure 1: The cPAX Aneurysm Treatment System.

New Devices

## NEW DEVICES (continued)

to giant or large aneurysms. Hence, smaller dimensional coils can migrate or float within the large and giant aneurismal sac, preventing acceptable filling and embolization of the aneurysm. The cPAX implant material is larger in cross-sectional diameter; so an equal length of cPAX increases the filling volume (packing density) within the aneurismal sac. Animal and clinical studies have shown minimal evidence of compaction or migration with the cPAX.

### **Clinical studies**

The safety of the device was assessed initially through many animal studies. In humans, two separate prospective, single-center, open-label studies were conducted in Brazil to evaluate the device. These studies allowed inclusion of patients with different criteria in addition to the criteria for which the device was approved (i.e., aneurysms less than 10 mm, or irrespective of the neck size and the use of adjunctive devices such as stents). There were 43 subjects with 44 aneurysms enrolled. Treatment was attempted on 39 aneurysms in 38 subjects, and 36 subjects with 37 aneurysms were treated. All of the 32 subjects available at 90 days follow up were assessed by cerebral angiogram. Fifteen aneurysms in 14 subjects met criteria for which the device was approved for by the FDA.

### **Safety and side effects**

Nine patients suffered side effects of which 5 were serious in the HDE (Humanitarian Device Exemption) group. Ischemic stroke was the most common side effect (14.3%). Other serious side effects included hemiparesis, hemorrhage, death and parent artery occlusion. Non-serious side effects included confusion, chemical meningitis, vasospasm and mild headache. Acute ischemic stroke and hemorrhage were

the most common serious side effects in the whole cohort; however, less frequent than HDE subgroup (10.5% for both). The incidence of adverse side effects in this limited cPAX cohort was consistent with other HDE-approved stent-assisted coiling devices in the treatment of large and giant wide-necked aneurysm. This led to FDA approval as an HDE for treatment of giant cerebral aneurysms that require assisted treatment devices.

### **Clinical benefits**

At 90 days follow-up, 60% of the whole cohort patients had more than 90% occlusion of the aneurysm. This rate was 66.7% in the HDE group. The rate of aneurysms requiring retreatment at 90 days post treatment was 39.4% overall and 42.9% in the HDE population. The retreatment rate was lower than that in aneurysms treated with currently available devices. This suggests efficacy of this device in the initial treatment of large cerebral aneurysms in conjunction with assist-devices which reduces or obviates the need for retreatment.

### **Conclusions and future recommendations**

The cPAX treatment device offers new options for treatment of large and giant cerebral aneurysms which requires use of assistant devices. Treatment of these aneurysms is usually challenging for both endovascular or classical neurosurgical approaches. The success rate, the lower rates of re-treatment needs without an increase in side effects of this device appear promising. These results need to be confirmed by further studies which will lead to better identification of other potential side effects and clinical outcomes. This may also lead for expanding the approval to include other forms of cerebral aneurysms, in case clinical benefits were found.

# UPCOMING MEETINGS

## **LINC Houston**

December 5-8, 2011

## **International Stroke Conference**

New Orleans, Louisiana

February 1-3, 2012

## **American Academy of Neurology**

New Orleans, Louisiana

April 21-28, 2012

## **Anatolian Course of Interventional Neuroradiology**

Istanbul, Turkey

May 30-June 1, 2012

[www.acinr2012.org](http://www.acinr2012.org)

## **SVIN 5th Annual Meeting**

Fontainebleu Hotel, Miami, Florida

October 27-28, 2012

[www.svin.org](http://www.svin.org)

Dear SVIN Members,

We would like to add a new section in the SVIN Newsletter: SVIN Members in the News. This section will include SVIN members who have been featured in the news, awarded with new research grants or interim publications. We welcome you to contribute to this section to help us highlight your achievements. Please send announcements to [info@svin.org](mailto:info@svin.org).