

AANS/CNS Section on Cerebrovascular Surgery

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From the Chair

Gregory B. Thompson, Jr. MD

Looking Forward: Strengthening the Subspecialty

It is with a great sense of honor and anticipation that I receive the baton of leadership for our section from Robert Rosenwasser, MD. This is an important time for our subspecialty and Robert has led us well. Foremost among his work over the past year have been his continued leadership efforts regarding endovascular training standards and subspecialty accreditation. As endovascular techniques have continued to become an increasingly prominent part of our specialty, the CV Executive Committee, under Robert's leadership, has worked diligently to formalize subspecialty endovascular training standards within our specialty and make clear that the Cerebrovascular Section is the organizational home for endovascular neurosurgeons. At the meeting this past June of the Society of Neurological Surgeons, or Senior Society, Dr. Rosenwasser, Robert Harbaugh, MD, and Donald Quest, MD, the AANS president, led a panel discussion of the possibilities for formalized endovascular subspecialty accreditation pathways in neurosurgery. This culminated in the Senior Society's approval of the request for formalized endovascular subspecialty accreditation, based upon recommendations from the Committee on Accreditation of Subspecialty Training. The document approved by the Senior Society, "Program Requirements for Training in Endovascular Neurological Surgery," was based on the existing ACGME document originally written jointly by the leadership of the CV Section and the ASITN and published in the *American Journal of Neuroradiology* in 2000.

The 2006 Annual Meeting of the Congress of Neurological Surgeons scheduled Oct. 7–12 features two outstanding cerebrovascular sessions that John Wilson, MD, and Chris Getch, MD, have developed. The scientific sessions will be marked by a slightly different and thought-provoking format in which the abstract presentations will be followed by short critical reviews by invited expert commentators. The meeting will be particularly highlighted by the annual Charles Drake Lecture, which this year will be given by Hunt Batjer,

MD, the Marchese Chair of the Department of Neurosurgery at Northwestern University. Fittingly, Dr. Batjer is a former trainee of Dr. Drake and is renowned for his consummate surgical and teaching expertise. Dr. Batjer's presentation, "Selected Drake Teachings: An Affectionate Look Back and a Look Forward," is one not to be missed.

Much thought and great preparation have also taken place for our annual Cerebrovascular Section meeting in San Francisco, Calif., Feb. 7–9, 2007. This annual meeting marks the first time that the scientific program of the Cerebrovascular Section and the American Society of Interventional & Therapeutic Neuroradiology will be fully integrated with the International Stroke Conference Meeting, offering our members the benefits of the Stroke Conference while at the same time continuing to offer two and a half days of continuous scientific programming produced by the CV Section and ASITN members. Michael Cawley, MD, and Murat Gunel, MD, from the Cerebrovascular Section and Gary Nesbit, MD, and Lee Jensen, MD, from the ASITN have developed an exciting and innovative concurrent track tailored to neurosurgeons, interventional neuroradiologists, and endovascular surgeons. The program, including five abstract sessions, will also include sessions on current and future aneurysm management, cerebrovascular occlusive disease, central nervous system vascular malformations and cerebrovascular genetics. The Luessenhop Lecture, "Skull Base Techniques for Every Day Aneurysm Surgery," will be given by Arthur L. Day, MD.

The leadership of both the AANS/CNS Cerebrovascular Section and the ASITN is excited about this integration into the International Stroke Conference and feels strongly that this new format will enhance our collaborative relationships with other specialties in the cerebrovascular sciences. Cerebrovascular Section members are invited and encouraged to attend the section's business meeting on Monday evening immediately following our first cerebrovascular session for more information on this upcoming meeting. ■

Technology Report

Ricardo J. Komotar, MD, Sean D. Lavine, MD, and E. Sander Connolly Jr., MD

Intra-Aortic Balloon Counterpulsation for Cerebral Vasospasm

Cerebral vasospasm is the leading cause of morbidity and mortality following aneurysmal subarachnoid hemorrhage. Despite maximal medical therapy, up to 15 percent of patients surviving the ictus of subarachnoid experience stroke or death from vasospasm (1). For cases of vasospasm that are refractory to medical treatment, endovascular techniques are frequently employed, including balloon angioplasty with or without intra-arterial infusion of vasodilators. Recently, intra-aortic balloon counterpulsation has been evaluated as a potential therapeutic intervention in patients with refractory vasospasm.

Intra-aortic balloon counterpulsation, or IABC, originally was designed specifically for the treatment of patients with cardiogenic shock but increasingly has been utilized to improve non-cardiac tissue perfusion in a variety of settings (2–4). Implementation of this technique entails placement of an aortic balloon distal to the origin of the left subclavian artery. This balloon inflates upon aortic valve closure during each cardiac cycle, displacing blood that would normally remain in the aorta during diastole and improving flow to the coronary arteries, the carotid and vertebral arteries, and the peripheral circulation (Figure 1A). Overall, diastolic blood flow is augmented and pulsatility is heightened. The device also reduces afterload and further improves cardiac output by deflating when the aortic valve opens (Figure 1B). In short, IABC decreases cardiac work, improves cardiac output, and heightens tissue perfusion by augmenting blood flow.

In 1995 Nussbaum and colleagues first demonstrated the efficacy of IABC in improving cerebral blood flow in a canine model of cerebral vasospasm (2). In this study, cerebral vasospasm was induced in 10 adult mongrel dogs using a “two-hemorrhage” model. Cerebral blood flow was then measured using radiolabeled microspheres, before and after activation of an intra-aortic balloon pump. The authors found cerebral blood flow to significantly increase with IABC in all 10 animals, supporting IABC as an important clinical option in cases of refractory vasospasm following aneurysmal subarachnoid hemorrhage.

Subsequently, Nussbaum and colleagues utilized IABC in a patient with subarachnoid hemorrhage and severe cerebral vasospasm (5). This patient’s postoperative clinical course was complicated by concomitant myocardial infarction, which prevented effective triple H therapy. Thus, IABC was instituted and Xenon-enhanced computed tomography, or Xe-CT, was used to obtain serial measurements of cerebral blood flow with and without IABC over a four-day period. The authors found that IABC dramatically improved cardiac function, as Xe-CT demonstrated significant improvement in cerebral blood flow. The lower the amount of cerebral blood flow before IABC, the greater the improvement with IABC ($p=0.0007$), suggesting this therapy to be most effective in reversing ischemia in the most severely affected regions. Cerebral blood flow improvement ranged from 33 percent to 161 percent above baseline and averaged 69.3 percent.

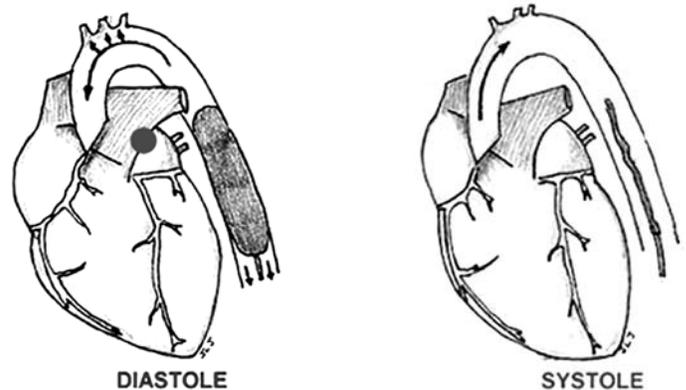


Figure 1A The balloon is inflated during diastole in sync with the closure of the aortic valve, providing increased cerebral artery blood flow and increased myocardial oxygen supply.

Figure 1B The balloon is deflated just before systole, decreasing afterload.

Images courtesy of Kansas University Medical Center, Department of Cardio-Respiratory Medicine

The authors also noted that IABC improved cerebral blood flow in all regions of the brain, as opposed to balloon angioplasty that is directed at treating a focal area of vessel narrowing. Interestingly, IABC continued to improve cerebral blood flow on days eight and 10 after subarachnoid hemorrhage, despite complete resolution of myocardial dysfunction on repeat echocardiogram. Thus, IABC should not be restricted to patients with severe myocardial ischemia and may be efficacious even in patients with normal or mildly dysfunctional myocardium. Taken together, these findings further suggest that IABC is a rational treatment option for cerebral vasospasm in carefully selected patients.

Although no IABC complications were observed in this case, use of this device may be associated with ipsilateral lower extremity ischemia, insertion site hemorrhage, infection, thrombocytopenia, pseudoaneurysm of the femoral artery, and, rarely, aortic dissection or gas embolism from balloon rupture. Consequently, IABC is absolutely contraindicated in the presence of an aortic aneurysm or aortic dissection, while aortic regurgitation and severe peripheral vascular disease are relative contraindications. One major concern regarding the use of IABC in patients with acute subarachnoid hemorrhage is the potential need for anticoagulation. However, anticoagulation is generally unnecessary during the first 48 hours as long as the balloon is being pulsed, the distal lower extremity pulse is strong, and a good cardiac output is maintained. Past 48 hours low-dose heparin therapy is recommended.

IABC has several potential advantages over traditional treatment measures for cerebral vasospasm. While triple H therapy may be dangerous or ineffective in elderly patients, patients with

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ASA Stroke Council Membership Encouraged

Colin Derdeyn, MD

I am sure that most of you would agree that stroke care—both acute management and prevention—is a central part of your practice. That is why I encourage you to join the American Stroke Association. The ASA is an independent division of the American Heart Association dedicated to reducing death and disability due to stroke. It is the second largest source of funding for stroke research after the National Institutes of Health, and many of us have benefited from its support.

ASA membership offers two compelling benefits: reduced registration fees to the International Stroke Conference, the largest forum for basic and clinical stroke research in the world, with over 5,000 professional registrants; and a subscription to *Stroke*, the leading journal in cerebrovascular disease. Membership fees are reasonable compared to those of other professional societies.

The ASA relies on the Stroke Council for guidance on scientific and clinical issues. The Stroke Council would benefit greatly from your involvement, as you offer a unique and often underrepresented perspective on cerebrovascular disease. Many neurosurgeons have lent their time and expertise to the council. For example, Marc Mayberg, MD, recently stepped down as the chair of the council, and Robert Harbaugh, MD, currently sits on the leadership committee. I am currently the chair of the membership

committee, succeeding Lee Guterman, MD in the position. There are many opportunities for participation in the Stroke Council.

One example of the benefits of Stroke Council involvement is the ISC programming jointly sponsored by the CV Section and American Society of Interventional & Therapeutic Neuroradiology. It has allowed us to bring topics such as the treatment of arteriovenous malformations and aneurysms to a large audience. As you may recall, the first joint meeting was organized in 1998 as a satellite meeting of vascular neurosurgeons and interventional neuroradiologists, held either before or after the ISC meeting. The meeting grew over the years to a substantial size and duration, and most attendees did not attend the ISC meeting. For the past two years we have run concurrent sessions of joint meeting programming at the ISC. The sessions have been very well attended and well received.

The ASA and the Stroke Council need the participation of more neurosurgeons. Your involvement will benefit both you and your profession. Please consider joining the ASA Stroke Council. For more information, visit <http://my.americanheart.org/portal/professional>.

Colin Derdeyn, MD, is chair of the Membership and Communications Committee of the ASA Stroke Council. ■

2007 ISC Takes Innovative Approach

Yvonne Boyack

The American Stroke Association's International Stroke Conference 2007 will be held Feb. 7–9, 2007, at Moscone West Convention Center in San Francisco, Calif. This year we are excited to announce that the AANS/CNS Cerebrovascular Section and the American Society of Interventional & Therapeutic Neuroradiology, or ASITN, have integrated their annual conference into the International Stroke Conference.

The ISC features an innovative track which the Cerebrovascular Section and the ASITN have tailored for neurosurgeons, interventional neuroradiologists, and endovascular specialists. The ISC will also feature special symposia on a number of topics including metabolic downregulation in cerebral ischemia, diagnosis and management of arteriovenous malformation, aneurysm and intracranial hemorrhage, and other informative symposia.

The ISC provides unique opportunities to meet with colleagues from around the world who have wide-ranging research interests and expertise in stroke prevention, diagnosis, treatment, and rehabilitation. We anticipate more than 4,000 attendees, as well as exhibitors displaying new stroke products and services. The ISC offers a preconference symposium, oral presentations, and posters,

as well as special lectures on recent advances and state-of-the-art technologies.

Valuable AHA/ASA professional membership benefits include up to \$110 off of ISC registration and deep discounts for other scientific conferences. Premium Professional Members also receive online access to all five AHA scientific journals, including the leading journal in cerebrovascular disease, *Stroke*. Join the Stroke Council and share your unique perspective. AHA/ASA membership provides the opportunity to develop relationships with other specialties, learn about advances in other disciplines, and ultimately enhance your clinical and research work. For example, Stroke Council members have developed ISC programs that are jointly sponsored by the Cerebrovascular Section and the ASITN. These programs have allowed us to bring topics such as the treatment of arteriovenous malformations and aneurysms to a large audience.

We look forward to seeing you in San Francisco for the 2007 International Stroke Conference. Please visit our Web site, www.strokeconference.org, for up-to-date conference information.

Yvonne Boyack is manager of scientific conference programs for the American Heart Association. ■

What Would You Do?

Contributed by Charles Prestigiacomo, MD

A 22-year-old man with no significant medical history sustained a Hunt-Hess V subarachnoid hemorrhage secondary to this ruptured 3.8 cm right carotid aneurysm. Medically unstable for the first 72 hours, aggressive pulmonary care and critical care improved his condition, though neurologically, he remained a Hunt-Hess V. The family requested that he undergo treatment for his ruptured aneurysm.

What would you do?

Send your response to Murat Gunel, MD, murat.gunel@yale.edu.



Figure 1 Admission CT without contrast demonstrating the aneurysm as a “negative” against the acute blood in addition to edema and early demarcation of frontal lobe infarction.



Figure 2 Three-dimensional reconstruction from CT angiography demonstrating fusiform aneurysm incorporating nearly the entire length of the supraclinoid carotid artery. Note that the internal carotid terminus is spared. Also note right superficial temporal artery is of acceptable caliber (partially cut on this processed image).



Figure 3A Anteroposterior angiogram of the right internal carotid artery. Aneurysm measures 3.8 cm.

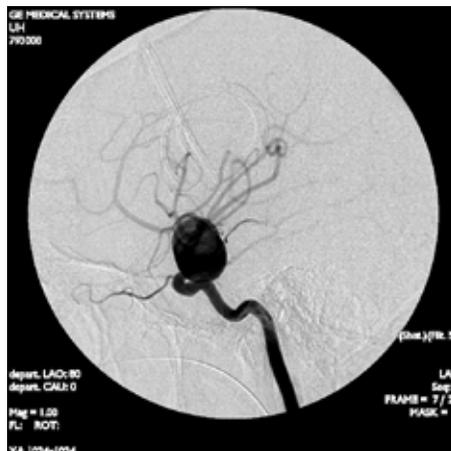


Figure 3B Lateral projection of the right internal carotid artery injection. The slight shift in bony registration on the subtraction image demonstrates the location of the anterior clinoid relative to the proximal portion of the aneurysm.



Figure 4 Left internal carotid artery injection demonstrating cross-filling with slight asymmetry (delay) in transit time of right middle cerebral artery territory relative to left MCA territory.

Submit a Case

To submit a case for possible inclusion in an upcoming issue of *Cerebrovascular News*, please provide the following information.

- Two to four deidentified images, at a resolution of 300 dpi, with appropriate legends.
- The age of the patient
- Therapeutic options to be considered.
- (Optional) One or two questions pertinent to the case.

E-mail your case to:
Murat Gunel, MD
Department of Neurosurgery
Yale University School of Medicine
murat.gunel@yale.edu

intrinsic cardiac disease, or patients with cardiac dysfunction following subarachnoid hemorrhage, IABC increases cardiac output and cerebral perfusion pressure while decreasing cardiac work, reducing cardiac oxygen requirements, and increasing coronary artery blood flow. Moreover, IABC does not substantially elevate systolic blood pressure, thereby lowering the risk of intracerebral hemorrhage or hemorrhagic conversion of prior cerebral infarction.

Although cerebral vasospasm continues to be the most common cause of postoperative morbidity and mortality following a subarachnoid hemorrhage, improvements in neurointensive care monitoring and diagnostic studies have allowed rapid identification of patients reaching critical reductions in cerebral blood flow. In addition to traditional medical management, the introduction of endovascular treatments, such as intra-aortic balloon counterpulsation, has expanded the therapeutic armamentarium for this condition. Moving forward, rigorous prospective outcome assessments are necessary to clearly delineate the efficacy and indications for these techniques.

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Newsletter Mission Statement

The newsletter is distributed to all members of the AANS/CNS Cerebrovascular Section. The purposes of the newsletter are to:

- Promote communication among section members.
- Promote communication among the section's Executive Committee and the members.
- Promote coordinated activities and a common purpose within the section.
- Inform the membership of research, educational, and employment opportunities.
- Inform the membership of new technical developments in the treatment of cerebrovascular disease.
- Promote research, patient care, and educational activities of the section.

From the Editor

Murat Gunel, MD

The Fluid State of the Neurovascular World

Recent clinical and medical device advances have led to a new phase in the treatment of neurovascular disorders through endovascular technologies that are less invasive than traditional open microsurgical techniques. Recent advances in molecular genetics and biology have enabled us to unravel the mechanistic underpinnings of neurovascular disorders, opening the door to a new understanding of neurovascular disease. As our knowledge base becomes more sophisticated, we will undoubtedly be led to a new phase in the treatment of cerebrovascular disease.

These advances not only will allow us to diagnose cerebrovascular disorders early, sometimes prior to clinical presentation as primary and secondary prevention efforts, but also to begin a new “molecular” phase of treatment. In this fluid state of the neurovascular world, we as neurosurgeons cannot become passive onlookers; we must continue to be integral contributors. To be leaders in this effort we must continue to collaborate with our colleagues in the interventional radiology and stroke neurology worlds.

Consistent with this spirit, for the first time we have combined our annual meeting with that of the International Stroke Conference. I served as the scientific committee chair of the Cerebrovascular Section annual meeting last year, and I currently serve as the annual meeting chair along with our scientific chair, Michael Cawley, MD. We, alongside Greg Thompson, MD, have put forth unrelenting effort to make this meeting successful. Now we need your help to support this effort and make this year's meeting a success. We not only need your attendance but also your participation in the presentation of scientific data.

This combined approach and open dialogue across medical worlds will ultimately lead to new ways to diagnose, treat and prevent neurovascular disorders. We are not alone in this effort. Combining our work in the ever-changing world of neurovascular disease with the work of our colleagues from other specialties will strengthen us and benefit our patients. Neurosurgeons must continue to lead this field not only in the operating room, but also by providing their unique perspectives in basic and clinical research efforts. Remember that unity brings strength, especially in our daily challenge to cure these deadly disorders.

Letters to the Editor

One of the main purposes of Cerebrovascular News is to promote communication among members of the AANS/CNS Cerebrovascular Section. Your insights, questions, and comments increase the section's value for everyone. Please send your input to Murat Gunel, MD, editor, Cerebrovascular News, at murat.gunel@yale.edu.

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Apply for CV Section Membership Online

The online application process for membership in the AANS/CNS Cerebrovascular Section decreases the time from application to membership and expedites the extension of Cerebrovascular Section benefits to new members.

Applying is this easy:

1. Go to www.MyAANS.org.
2. Login using e-mail address and password, or register by entering name and e-mail address and chosen password.
3. Select: Member Applications from the left-hand tool bar.
4. Select: Create a New Application.
5. Select: AANS/CNS Cerebrovascular Section.
6. Complete and submit the application following the online instructions.

*Questions may be directed to AANS/CNS Section Services,
sjm@aans.org or (888) 566-2267.*