CV Section News

Chairman's Message

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To paraphrase a well-known television show, "winter is here" and for many this means short cold days and long, even colder nights (not to mention a few hefty doses of snow for some of us). Winter is often used a metaphor for bleakness and harshness, but fortunately for our neurovascular specialty the outlook is anything but bleak or harsh. We can look back on a busy, productive year that saw increases in the use of mechanical thrombectomy for acute ischemic stroke and a renewed interest in minimally invasive therapies for the treatment of intracerebral hemorrhage. Now as we start 2017, we can look forward to continued growth of our specialty as our abilities, and concomitantly our role, in the treatment of both ischemic and hemorrhagic stroke continues to grow.

Since our last newsletter this summer, many of our members attended the 2016 CNS Annual Meeting in San Diego where CV Scientific Program Chair, Brian Jankowitz and Co-Chair Stav Tjoumakaris put together a particularly engaging program. Highlights included a vigorous discussion of the pros and cons of various specialties working together in a comprehensive stroke center. Gary Steinberg of Stanford University gave this year's Drake Lecture. Drawing on his background as a busy microvascular surgeon with an active NIH-funded laboratory, Dr. Steinberg was able to offer some interesting perspectives on our dynamic field. In February, we will again join forces with the SNIS for our annual scientific meeting. The meeting will be held in Houston, Texas at the JW Marriott Houston Galleria, hopefully giving many of us the opportunity escape some of the winter weather mentioned earlier. Adam Arthur will be leading the scientific program on behalf of the CV section, while Robert James will be coordinating efforts from the SNIS side. A preliminary program with lots of interesting and thought provoking content is available on-line at the CV Section website. Our international partner for this year's meeting will be Federacion Latinoamerica de Sociedades Neurocirugia (FLANC) and Robert Harbaugh from Penn State University will be delivering the Luessenhop lecture. A former Chair of the CV Section and prior President of the AANS, Dr. Harbaugh has been visionary in his embrace of neuroendovascular techniques and the importance of utilizing appropriate medical evidence in clinical decision making. The AHA/ASA International Stroke Conference (ISC) will immediately follow our section meeting and will also take place in Houston. As usual, this year's ISC is sure to feature presentations of new and groundbreaking work in the stroke field. Both the CV Section Annual Meeting and the ISC are valuable opportunities to learn about the latest in neurovascular science and I strongly encourage our members to attend both meetings.

In keeping with the winter theme, one area that often comes up this time of year is philanthropy. Gift

giving and "giving back" in general are central themes to many of this season's holidays. The CV Section has partnered with the Neurosurgery Research and Education Foundation (NREF) to enhance our ability to raise funds and coordinate philanthropic efforts on behalf of research and education in neurovascular disease. This partnership involves collaborations in three major areas, Education, Outcomes and Research programs, as well as the Charles Drake Honor Your Mentor Fund. In 2016 we were fortunate to receive a generous multi-year donation from Dr. Arvind Ahuja, a longtime CV Section member. Dr. Ahuja's donation will help support a new clinical research fellowship administered by the CV Section in conjunction with NREF. However, there remain multiple areas within the CV Section that will benefit from ongoing financial support. As a section, our leadership team continues to seek corporate sponsorship, but for these solicitations to be most effective it is important for us to demonstrate a robust commitment to the section by our own members. To this end, I strongly encourage all of our members to make a donation to NREF in support of the CV Section. Contributions can be made directly to CV Section Education, Outcomes and Research programs, as well as to the Charles Drake Honor Your Mentor Fund, which supports CV related registry efforts. To donate, simply visit the NREF website (http://www.nref.org/Donate.aspx/), select the area you wish to support (Education, Outcomes and Research), and then select the CV Section option as the group to which you would like your donation directed. Alternatively, you may visit the Honor Your Mentor site (http://www.nref.org/Honor%20Your%20Neurosurgical%20Mentor.aspx/) and click on the link to the Charles Drake Honor Your Mentor Fund. For the CV Section to continue to grow as a force in neurovascular patient care, we must remain leaders in cutting edge neurovascular research, as well as in the education and training of the next generation of neurovascular specialists.

Finally, many thanks as always to our CV Section Executive Committee and our many active section members whose dedication and volunteerism allow this organization to function at the highest level. Best wishes to all for a healthy, productive and enjoyable new year. See you in Houston!

Kevin M. Cockroft, M.D., M.Sc.
Chair, AANS/CNS Cerebrovascular Section

SECRETARY'S MESSAGE

The AANS/CNS Section on Cerebrovascular Surgery is happy to report continued success as it represents neurosurgery to the larger cerebrovascular community in 2016. We have seen the successful development of the cerebrovascular module of QOD, as well as strengthening relationships with the Society of Neurointerventional Surgery (SNIS). We enter into 2017 with plans for an exciting annual meeting to discuss progress in the care of acute ischemic and hemorrhagic stroke patients. As CV section members, you can be proud of the section's efforts to improve patient care.

This year's upcoming annual meeting is in Houston, TX. Dr. Adam Arthur, in collaboration with the SNIS, has planned a provocative program that will doubtless leave everyone in attendance excited that they were able to make it. In addition, the CV Section/SNIS collaboration continues stronger than ever, with collaborative efforts on policy development, research, education, and quality initiatives.

The CV Section remains a vital component of the neurosurgical community and you, as a member, can be proud of the contributions made by the section over the past months. We encourage all neurosurgeons and cerebrovascular practitioners to become involved in our quality, educational, research and advocacy activities.

J Mocco, MD, MS

MEMBERSHIP UPDATE

William Mack, MD

The membership of the Section is currently 2354. It has increased over the past year in every category (388 active, 105 lifetime, 61 international, 43 adjunct, 1728 resident/fellow, 36 medical students). We have made a strong push to reach out to members and encourage dues payments and section activity. The membership committee will continue to work with the parent organizations (AANS/ CNS) and the young neurosurgeons committee to recruit new members in neurosurgery and allied specialties. Membership benefits include priority access to seminars and courses at the Annual Meeting, and receipt of the Cerebrovascular Section Newsletter.

MEETING UPDATES

AANS/CNS CV SECTION ANNUAL MEETING (February 20-21, 2017, Houston, TX)

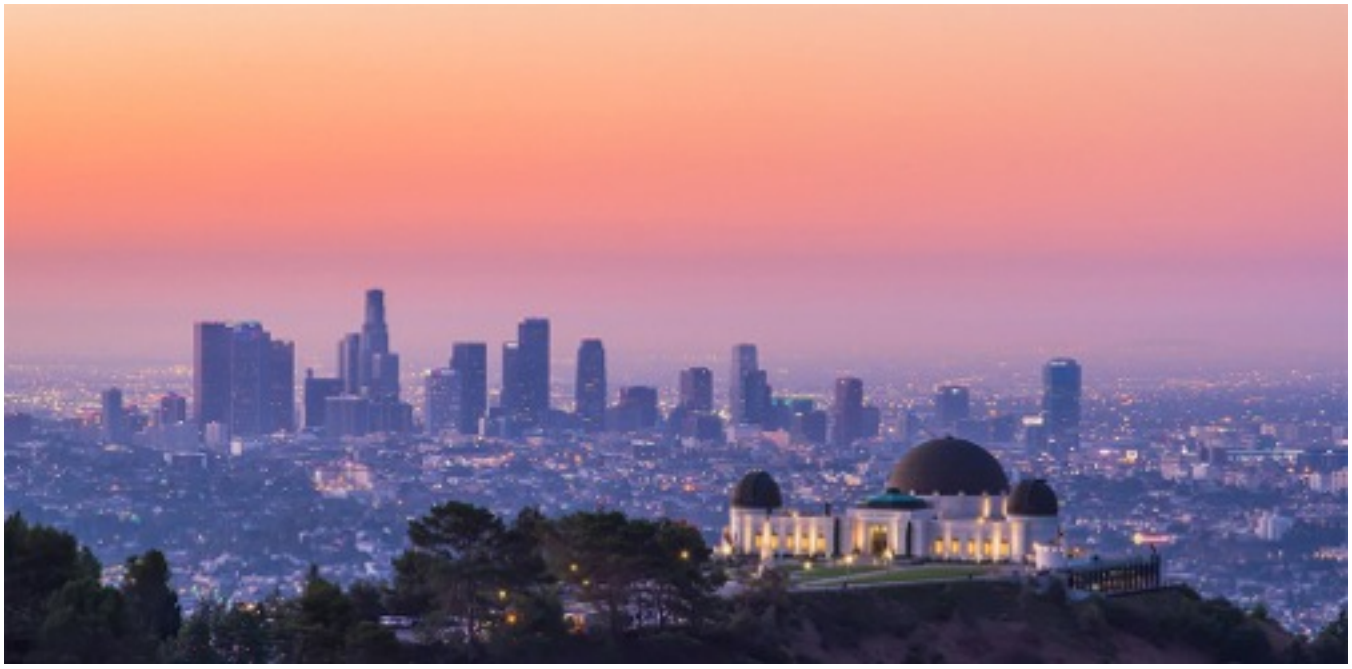
Adam Arthur, Robert James

We hope you join us in Houston for the AANS/CNS Joint Cerebrovascular Section Annual Meeting, held just prior to the International Stroke Conference. There are a number of excellent sessions and engaging speakers scheduled. The collaboration between the AANS/CNS Joint Cerebrovascular Section and the SNIS has been fruitful and we hope you will enjoy the content that these two societies have worked to provide. In addition this year we are fortunate to have representatives from FLANC to provide their own perspective and expertise. Over the course of two days we will have sessions on clinical research, basic science, expert opinion on specific cases and the chance to learn from colleagues from industry both in the exhibit hall and dedicated programming. We also have specific sessions devoted to bypass, AVMs, acute stroke care delivery, avenues for research funding, venous disease, and the treatment of asymptomatic carotid disease.

INTERNATIONAL STROKE CONFERENCE (February 22-24, 2017, Houston, TX)

Judy Huang, Louis Kim, Andrew Ducruet

We hope you can join us at the International Stroke Conference in Houston, Texas on February 22-24, 2017, immediately following the CV section meeting. The session Multimodality Treatment for Arteriovenous Malformations will take place on Wednesday, February 22, 2017, 3:30 pm - 5:00 pm and features speakers Dr. Michael Lawton, Dr. Sean Lavine, and Dr. Christopher Wallace.



AANS ANNUAL MEETING (April 22-26, 2017, Los Angeles, CA)

Stavropoula Tjoumakaris, M.D.

Brian Jankowitz,M.D.

Please join us for the 2017 AANS Cerebrovascular Sessions to be held on Monday, April 24 from 2-5:30 PM and Wednesday, April 26 from 2-4:30 PM. Dr. Nick Hopkins will present the Yasargil lecture and Dr. Robert Rosenwasser will present the Donaghy lecture. Dr. Fady Charbel will discuss his role in helping bring quantitative MRA from concept to clinical relevance. We also plan on a stimulating discussion about the future of cerebrovascular training with a panel discussion entitled "Optimizing Cerebrovascular Training" followed by Dr. Lawton's plans for the future as the new leader of the BNI.

Technology Forum: Flow diverters for distal and bifurcation aneurysms

Andrew F. Ducruet, M.D.

Flow diversion has revolutionized the treatment of intracranial aneurysms. Although the FDA indication remains limited to large and giant aneurysms of the internal carotid artery, flow diverters are increasingly being utilized off-label to treat more distal aneurysms. In this technology forum, Drs. Crowley and Lopez from Rush University as well as Drs. Panczykowski and Jankowitz from the University of Pittsburgh discuss their experiences using flow diverters for distal and bifurcation aneurysms.

Flow Diverters for Bifurcation Aneurysms

R. Webster Crowley, M.D.

Demetrius K. Lopes, M.D.

As our experience and understanding of flow diverters has grown, applying the technology to bifurcation aneurysms can be alluring. While it is certainly tempting to believe that the success seen with on-label flow diversion will translate to aneurysms in other locations, this is less clear-cut for bifurcation aneurysms. For these aneurysms, the involvement of additional branches present the endovascular neurosurgeon with a different set of challenges that make the decision making process more difficult than standard flow diversion cases. There are 3 primary concerns that come into play when placing flow diverters across bifurcations, that are either unique or perhaps magnified when compared to those seen with flow diverters in other locations.

The first of these regards the fate of covered perforators. We frequently hear from other physicians who express anxiety regarding placement of a flow diverter across small arteries not involved with the aneurysm. This is probably most commonly mentioned with coverage of the anterior choroidal artery, but clearly with bifurcation aneurysms this could involve lenticulostriate arteries for aneurysms of the ICA terminus, MCA bifurcation, or the anterior communicating artery, or perforating arteries of the basilar or posterior cerebral arteries for aneurysms of the posterior circulation. Fortunately, infarction from coverage of any of these vessels is extremely unlikely. Their demand as end-organ vessels does make them less likely to occlude, however they are also less tolerant of diminished flow. Therefore, we do believe more porous stents should be favored over flow diverters when appropriate (e.g. stent assisted coil embolization of wide necked aneurysm), and when flow diversion is utilized, placement of multiple overlapping flow diverters should be avoided when possible.

The second main concern is how flow diversion into one branch of a bifurcation will alter flow into the other remaining branch. There is mounting evidence that coverage of a large branch with a flow diverter decreases flow and may lead to occlusion of the covered branch.1 Anecdotally, this can lead to pressure dependent symptoms, or it may be clinically silent. Unfortunately, the perfusion impact on the jailed branch is unpredictable, and balloon test occlusion does not accurately simulate the clinical outcome of this treatment option. While this range of potential outcomes does not negate the fact that an individual bifurcation aneurysm may still be best treated with flow diversion, the possibility of symptomatic decreased flow through the un-stented branch should be factored into the decision-making process of whether or not to treat with flow diversion, and if that is the treatment option of choice, which distal branch the flow diverter should be placed into.

The third main concern is the potential for multiple inflow pathways into aneurysms at bifurcations. This is largely seen with basilar apex aneurysms, in which placement of a flow diverter from the basilar artery to one PCA could eliminate basilar inflow to the aneurysm, while flow from the uncovered posterior communicating artery may remain. This could have either positive or negative ramifications depending on whether the alternate pathway can be utilized to access the aneurysm or not. If aneurysm filling persists, and the aneurysm is inaccessible via the secondary inflow, the placement of the flow diverter may have created a more difficult situation in which all endovascular options have been eliminated. For this reason we do believe standard single or Y-stent-assisted coil embolization should be the preferred option for most bifurcation aneurysms.

Despite the concerns that come along with treating these lesions with flow diversion, in our opinion there is clearly a role for flow diverters for bifurcation aneurysms. However, they should generally be reserved for cases in which there are no other suitable options. Flow diverters should not supplant other intracranial stents for stent-assisted coil embolization. In other words, if a wide-necked aneurysm can be treated with coil embolization using a single stent or a Y-stent configuration, that is likely preferable to utilizing a flow diverter, whether it is used as a buttress to prevent coil prolapse or as a stand alone treatment. Similarly, if a bifurcation aneurysm can be treated with simple clip ligation, that is likely preferable to flow diversion.

The most obvious bifurcation aneurysms that are suitable for flow diversion are fusiform aneurysms, in which standard endovascular or surgical techniques are not feasible. Historically the only options for these aneurysms may have been surgical trapping or proximal occlusion often with an associated high-flow bypass. We believe flow diverters in these patients represent a safer option that is effective in reconfiguring the parent vessel rather than deconstructing or occluding it, and in our opinion has now become the preferred option for the majority of these lesions. (Fig. 1A-E)

The other group that may be reasonable for flow diversion are those aneurysms without a discrete neck in which two branch arteries arise from the aneurysm dome, yet one of the two involved branches is not accessible with a microcatheter. This lack of accessibility eliminates Y-stenting with coil embolization as an option, while placement of a single stent with subsequent coil embolization would risk abrupt sacrifice of the unprotected branch. For these aneurysms, it may be reasonable to consider placement of a single flow diverter for progressive deconstruction of the aneurysm.2,3 This involves placement of a flow diverter across the aneurysm into the accessible distal branch vessel. As flow diversion into the stented branch causes aneurysm thrombosis, this technique may lead to either progressive shut down of the unprotected branch, or development of a channel through the aneurysm that maintains branch patency. If the artery does go on to occlude it typically occurs in a delayed fashion, which would allow for development of sufficient collateral supply to the affected territory and resultant minimization of neurological sequelae. This is analogous to what is frequently seen with flow diverter treatment of ophthalmic artery aneurysms, in which the jailed artery (the ophthalmic artery) either goes on to occlude, or develops a channel through the aneurysm to maintain patency. The big difference here is that collateral supply to the ophthalmic artery territory through external carotid collaterals are usually quite robust, while the collateral supply to downstream MCA/ACA or PCA vessels is much more variable. Of note, the number of aneurysms that may require flow diversion for this reason is likely decreasing, as stents such as LVIS Jr. and Atlas are deliverable through smaller 0.017" microcatheters that are more navigable than larger microcatheters for the access of difficult arteries.

Ultimately, we do believe there is a very real place for the placement of flow diverting stents in bifurcation aneurysms. However, more traditional endovascular approaches, such as stent-assisted coil embolization, should be preferentially utilized when possible, and of course surgical clipping should be given full consideration for all cerebral aneurysms. This is perhaps particularly true for those aneurysms that would require more difficult or potentially less effective endovascular strategies.

1. Gawlitza M, Januel AC, Tall P, Bonneville F, Cognard C. Flow diversion treatment of complex bifurcation aneurysms beyond the circle of Willis: a single-center series with special emphasis on covered cortical branches and perforating arteries. J Neurointerv Surg. 2016;8(5):481-487.

2. Johnson AK, Tan LA, Lopes DK, Moftakhar R. Progressive Deconstruction of a Distal Posterior Cerebral Artery Aneurysm Using Competitive Flow Diversion. Neurointervention. 2016;11(1):46-49.

3. Wajnberg E, Silva TS, Johnson AK, Lopes DK. Progressive deconstruction: a novel aneurysm treatment using the pipeline embolization device for competitive flow diversion: case report. Neurosurgery. 2014;10 Suppl 1:E161-166; discussion E166.

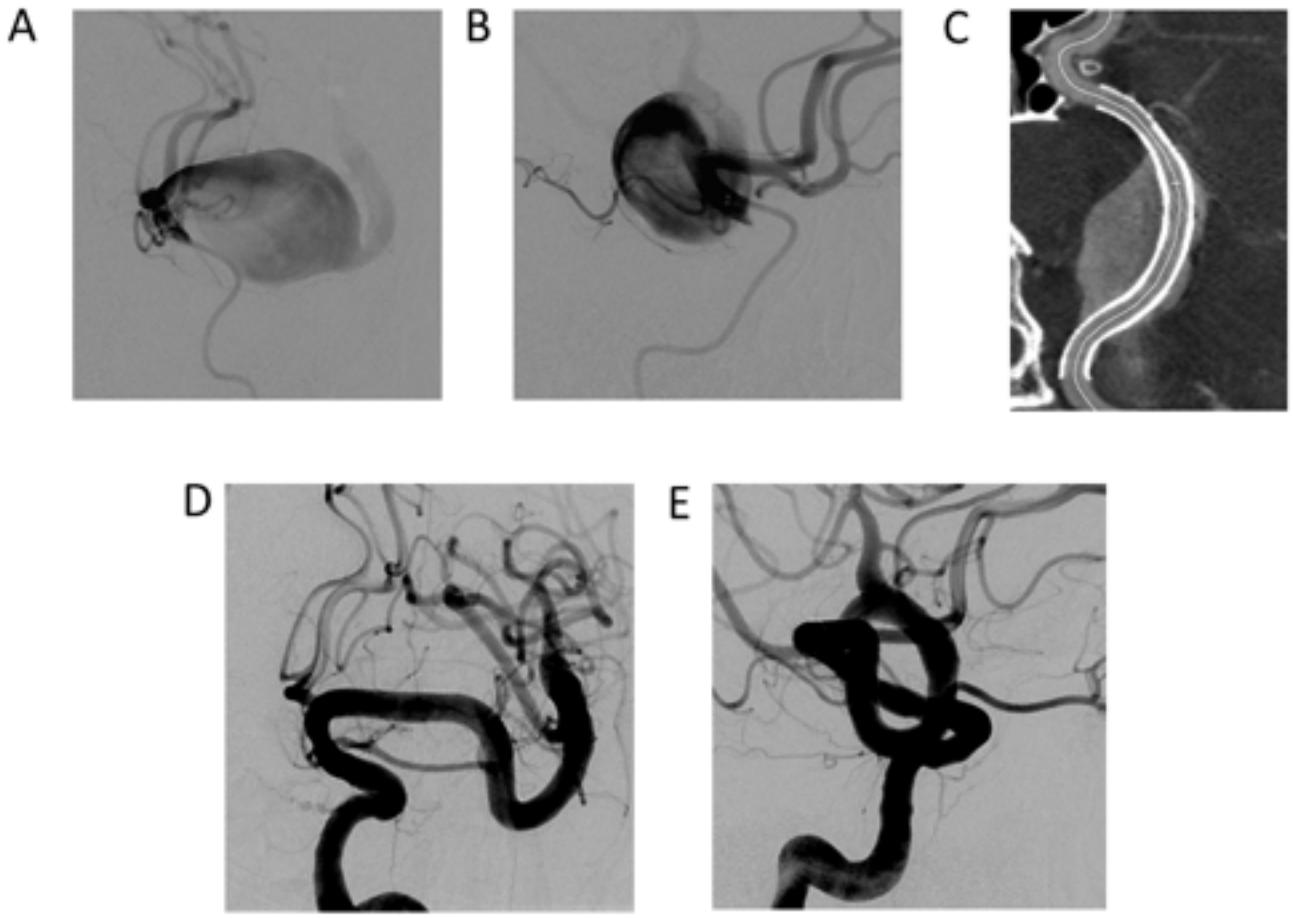


Fig. 1: Giant fusiform aneurysm of the left MCA found in a male in his 20's. Pre-operative PA and lateral angiographic images are seen demonstrating the aneurysm (1A, B). The aneurysm was treated with multiple overlapping Pipeline Embolization Devices from a large M2 branch into the left ICA. CTA reconstruction demonstrates the construct throughout the aneurysm (1C). The patient did well clinically, and a 3-month angiogram demonstrates complete angiographic reconstruction of the artery with no evidence of aneurysmal filling (1D, E).

Flow Diversion for Anterior Cerebral Artery Aneurysms

David M. Panczykowski, M.D.

Brian T. Jankowitz, M.D.

INTRODUCTION:

Conventional microsurgical and endovascular techniques remain principal therapies for anterior cerebral artery (ACA) aneurysms. However, complex ACA aneurysm architecture (fusiform, large or giant size, wide neck, branch incorporation, and/or prior treatment) poses a significant technical challenge. Flow diversion is being increasingly utilized for off-label treatment of distal and/or bifurcation aneurysms. This technology is an option for the treatment of complex ACA aneurysms that may be poor candidates for conventional techniques.

ILLUSTRATIVE CASES:

CASE I: A 43-year old female presented with a 4 mm neck remnant after coil embolization of a ruptured, bi-lobed pericallosal aneurysm (originally each lobe measured 4.5 x 3.5mm; Fig. 1). The proximal parent A2 measured 1.8 mm while the distal pericallosal was 1.7 mm. A 2.5 x 10mm Pipeline embolization device (PED) was deployed within the pericallosal, spanning the neck remnant and the pericallosal-callosomarginal bifurcation. Eighteen-month follow-up catheter angiography and MRA demonstrated complete aneurysm obliteration, patency of parent ACA as well as branch vasculature, and absence of in-stent stenosis (Fig. 2).

CASE II: A 50-year-old female presented with subarachnoid hemorrhage secondary to rupture of a previously clipped broad-necked aneurysm (11 mm × 5 mm) involving the entirety of the ACOM-A2 complex bilaterally and primarily filled from the left A1 (Fig. 3). The diameter of the left ACA proximal and distal to the aneurysm was 2.1 and 1.9 mm, respectively. A 2.5×16mm PED was deployed from the left A2 to A1 spanning the aneurysm neck. The aneurysm was then coiled from the contralateral side. The patient tolerated the procedure without complication. A follow-up angiogram at 7 months demonstrated completed aneurysm obliteration, patency of distal bilateral ACA vasculature, and absence of in-stent stenosis (Fig. 4).

DISCUSSION

Several reports have examined the use of flow diversion stents for the treatment of complex ACA aneurysms deemed excessively challenging for conventional methods. Early, smaller series demonstrated occlusion rates ranging from 64 to 71% in ACA aneurysms treated with flow diversion.1 Pistocchi et al reported on 21 ACA aneurysms treated with Silk or Pipeline flow diversion at a mean follow-up of 13 months.2 In this series, 79% of aneurysms were completely occluded; unfortunately, 22% also demonstrated in-stent stenosis and 11% suffered neurologic complications.2 More recently, Dabus et al. published their series of 20 complex ACA aneurysms treated with flow diversion.3 On follow-up (mean 10-months), 69% had achieved complete occlusion. Of the remainder, 1 had a residual neck and 4 demonstrated persistent aneurysm filling, while 2 significant neurologic

complications occurred including branch vessel occlusion/infarction and remote intraparenchymal hemorrhage.

These series, as well as the cases described above, suggest that flow diversion can be utilized for the treatment of complex ACA aneurysms that present a challenge for conventional microsurgical or endovascular therapies. Diligent device selection and avoidance of multiple devices in small vessels or perforator-rich areas may reduce post-procedural complications. We have yet to elucidate the minimal arterial diameter possible for pipeline placement. Long-term analyses of angiographic and clinical outcomes are needed to further improve patient selection and technical application of this approach.

1. Clarencon F, Di Maria F, Gabrieli J, et al. Flow Diverter Stents for the Treatment of Anterior Cerebral Artery Aneurysms: Safety and Effectiveness. Clin Neuroradiol. 2015.
2. Pistocchi S, Blanc R, Bartolini B, Piotin M. Flow diverters at and beyond the level of the circle of willis for the treatment of intracranial aneurysms. Stroke. 2012;43(4):1032-1038.
3. Dabus G, Grossberg JA, Cawley CM, et al. Treatment of complex anterior cerebral artery aneurysms with Pipeline flow diversion: mid-term results. J Neurointerv Surg. 2016.

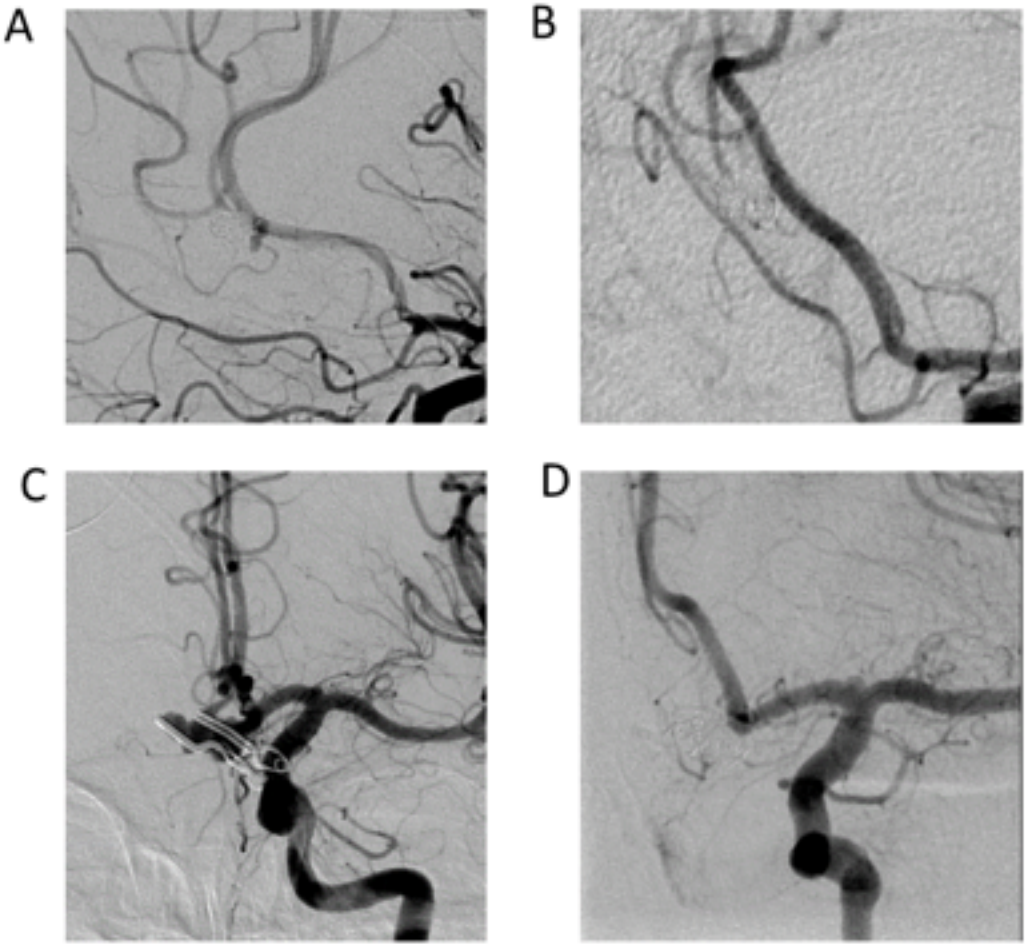


Fig. 1: Left ICA injection shows the 4 mm neck remnant of a previously ruptured, coiled, and re-coiled pericallosal-callosomarginal aneurysm. The proximal and distal vessels measure 1.8 mm and 1.7 mm respectively (A). After pipeline embolization with a 2.5 x 10mm PED, the 18 month f/u angiogram reveals complete aneurysm obliteration, patency of parent ACA and branch vasculature, and absence of in-stent stenosis (B). Left ICA injection shows the 6 mm remnant of a previously ruptured and clipped A.comm aneurysm. The proximal and distal vessels measure 2.1mm and 1.9 mm respectively (C). After pipeline embolization of the left ACA with a 2.5 X 16 mm PED and coiling from the contralateral side, the 7 month f/u angiogram reveals complete aneurysm obliteration, patency of distal bilateral ACA vasculature, and absence of in-stent stenosis (D).

OPPORTUNITIES FOR FUNDING

AANS FELLOWSHIP/GRANTS

http://www.aans.org/Grants%20and%20Fellowships.aspx

CNS FELLOWSHIP/GRANTS

https://www.cns.org/grants-awards/grants-awards-and-fellowships

AMERICAN HEART ASSOCIATION

http://my.americanheart.org/professional/Research/FundingOpportunities/Funding-Opportunities_UCM_316909_SubHomePage.jsp

BRAIN ANEURYSM FOUNDATION

http://www.bafound.org/applying-research-grant

THE ANEURYSM AND AVM FOUNDATION

http://www.taafonline.org/pr_grants.html

JOE NIEKRO FOUNDATION

http://www.joeniekrofoundation.com/research-grants/joe-niekro-research-grant/

Calendar

February 20-21, 2017
Cerebrovascular Section Meeting
Houston, TX

February 22-24, 2017
International Stroke Conference
Houston, TX

April 22-26, 2017
AANS Annual Meeting
Los Angeles, CA

October 7-11, 2017
CNS Annual Meeting
Boston, MA