



Angioma Alliance Newsletter

March, 2005

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Please note: In this newsletter, the terms "cavernous angioma," "cavernous malformation" and "CCM" are used interchangeably.

What's New?

Family Conference 2005

More details:

Angioma Alliance will be holding its second family conference Friday, June 24th through Sunday, June 26th at the Tremont Plaza Hotel in Baltimore, Maryland.

Registration: Registration forms for the conference will be available in late March. We expect that registration will be no more than \$65 per adult and \$35 per child in childcare. This fee includes a tour of the Johns Hopkins lab on Friday morning, presentations Friday afternoon, a Friday evening reception, breakfast on Saturday, and a full day of presentations and opportunities to hear each others' stories on Saturday. If we receive corporate sponsorships, we may be able to reduce the registration fee.

Hotel: We have reserved a block of rooms at the Tremont Plaza Hotel in the heart of the Inner Harbor. The rate for a Studio Suite is \$135 per night. The rooms feature fully equipped kitchens, separate seating areas, and high speed internet access. For families who need some help to make this affordable, Angioma Alliance is willing to pay \$15 per night toward your reservation. Please let us know if you will need this assistance before you reserve your room.

You can make a room reservation by calling the Tremont Plaza directly at 1-800-873-6668; you must let them know that you are part of the Angioma Alliance conference. The discounted room rate is available two days prior to and two days after the event in case you'd like to come early or stay after. The Tremont Plaza is guaranteeing that rooms will be available for us if you make your reservation by Thursday, May 26. After this, they will release the rooms in our block, and you'll be competing with the general public for a reservation. You will be charged

for one night's stay if you cancel your reservation with less 48 hours notice. Parking is available at a self serve lot next to the hotel for \$13/day or valet parking for \$25/day.

While we encourage everyone to stay at the Tremont Plaza if they are able, there are less expensive accommodations (ranging from \$79-\$99) available outside of town near the airport. These include a Red Roof Inn, an Extended Stay, a Microtel, and a Fairfield Inn. There is Metro service from the airport to the downtown area.

Program: Our speakers so far include neurosurgeons Dr. Richard Clatterbuck, Dr. Daniele Rigamonti, Dr. and Issam Awad, neurologist Dr. Leslie Morrison, geneticist Dr. Eric Johnson, and a representative from the Social Security Administration. We will also have a panel discussion about surgery issues from a patient and family perspective, and a structured opportunity to get to know each other.

There will be childcare available during the presentations for kids 13 and under. We are planning a field trip to Port Discovery, the wonderful Baltimore Children's Museum, during the presentations on Saturday.

How You Can Help: If you would be willing to volunteer during the conference, please let us know. We'll need help with registration, assembling binders, photography, and a host of other tasks. You can write at info@angiomaalliance.org or call 1-866-HEAL-CCM.

We also need corporate sponsors for the conference. If you have contact with a corporation that might be willing to become a sponsor at any level from \$500-\$25,000, we would love your help in soliciting them. Please see **Family Conference Sponsors** below for more information.

Patient Registry

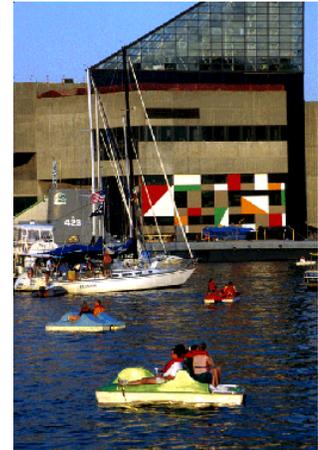
The Angioma Alliance Patient Registry continues to work its way toward becoming a reality. Two weeks ago, I received a message from Dr. Eugenio Pozzati, a leading cavernous angioma researcher who is based in Italy. **He asked if Angioma Alliance could help him to coordinate a three-year international multi-center cavernous angioma study.** I forwarded his message to several researchers that have worked with us, and within a day, researchers from Harvard, Yale, Johns Hopkins, Northwestern, Loyola, UCSF, and Prevention Genetics had offered to participate. This is extremely exciting news – we are becoming directly involved in moving research forward!



However, to begin this research, **Angioma Alliance needs to establish our patient registry as soon as possible.** We have been planning a registry for some time by becoming a member of the Genetic Alliance Biobank cooperative, but it is now time to act. In Dr. Pozzati's study, it will be our role to collect and store a broad range of information from each patient referred to us from the various research centers. This data will be available both to this study and to every future study involving cavernous angioma patients. For example, we have received a request from a researcher to use our proposed registry for her work examining the role of co-morbid disorders in cavernous angioma hemorrhage rates. Because the information from the international study will be in an Angioma Alliance registry rather than with an individual lab, she will be able to use the same records for her work. **The bottom line is that research is made more comprehensive and cost effective with our participation, and in many cases, will not happen without us.**

Our researchers need our help now, and we urgently need your financial support to establish this patient registry. We have raised nearly \$9,000 of the \$20,000+ we will need for the first year of the registry. We have two fundraising events planned over the next three months, but we also need individual or corporate donations to ensure our participation. With time, the registry will be supported by research grants, but it is up to us to provide the start-up funds.

Many of you have given generously in the past, perhaps even just recently, and we greatly appreciate your support. **We are asking now for a special donation** so that we can begin this work as quickly



as possible. Your investment in Angioma Alliance and in our patient registry will produce a tremendous benefit to those with cavernous angioma. Every contribution makes a difference. You can contribute by sending a check to Angioma Alliance, 107 Quaker Meeting House Rd., Williamsburg, VA 23188 or by using our Paypal connection. If you would like to host a fundraiser, please let us know. We now have a DVD that can be shown at privately hosted events explaining our illness, Angioma Alliance, and the patient registry. And, if you know of any companies or individuals that you think might be willing to underwrite a portion of the patient registry project, please let us know. This is a relatively small investment that will provide a disproportionately large return for our families. You can find more details about the registry at [Angioma Alliance Patient Registry](#).

What else you can do now. If you think you might want to become part of the registry when it is up and running, please let us know. It would be wonderful for us to collect contact information for as many folks as we can so that we can get started quickly. Also, if there are questions that you would like to see a registry address, please send them. Our email address is info@angiomaalliance.org. You are the experts on this illness - we would like to know what questions you would like answered.

Welcome Dr. Leslie Morrison, our newest Scientific Advisor



Dr. Leslie Morrison is a pediatric neurologist and an assistant professor at the University of New Mexico Medical School. Dr. Morrison has a research interest in neurologically based genetic disorders, particularly familial cavernous angioma and oculopharyngeal muscular dystrophy which have founder mutations within the Hispanic population of New Mexico. Dr. Morrison has worked with Dr. Doug Marchuk, another of our scientific advisors, performing a genetic analysis on those with the common Hispanic cavernous angioma founder mutation who are being seen at UNM. She will be working with us to develop the structure of our patient registry, to gather information from patients at UNM, and to analyze data as it becomes available.

Volunteer Opportunities



Have you been wondering how you could become more involved with Angioma Alliance? Well, Angioma Alliance is growing, and our need for volunteer help is growing as well. We've put together an exciting list of tasks that will be vital for moving us into the future. Some require a great deal of commitment or expertise; others are less time involved. Please look through the list and see if any of these opportunities appeal to you. Or, perhaps you know someone with a special skill who might be willing to give of their time or knowledge. If you'd like to volunteer but can't find the perfect job on our list, please contact us (info@angiomaalliance.org or 1-866-HEAL-CCM) and we'll talk about other possibilities. There is always something important to do. We are still an all-volunteer organization and are only as strong as our participating members.

Attorney – We are seeking an attorney with experience in non-profit law who can answer general questions and review our upcoming contract with the Genetic Alliance Biobank.

Database Technical Assistance - We will be creating an international directory of physicians who are familiar with CCM and have expressed a desire to be listed publicly (see [Physician Directory](#) below). Initially, the directory will include cerebrovascular surgeons. We'll collect information about their training

and experience as well as some basic office details. We will also be attaching patient feedback from our members to the listings. We'd like to house responses in a simple database. Our hosting service offers **mysql and PHP**, and we are looking for someone who may be familiar with this software to help us in setting up the project.

Website Maintenance – We are searching for someone who can take on responsibility for maintaining our Portuguese site. Although

knowledge of Portuguese is not necessary, it is helpful. The volunteer will be assisted by the staff of Dr. Jorge Marcondes' CCM research lab in Rio de Janeiro, all of whom are fluent in English.

Registry Nurse - When our patient registry is up and going, we will need a nurse to coordinate enrollment into the registry. Enrolling a patient includes obtaining their consent, having them fill out our questionnaire, reviewing medical histories, and organizing all of this information so that it can be entered into the database. We have a nurse who has already volunteered to do this, but we should have back-up help if we receive too many enrollments at the same time or to cover in case of vacations or other extended absence. Ideally, this should be an R.N. with some neuro experience who is comfortable with computers. This is an incredibly worthwhile job you can do from your home.

Ebay Auction – For the last two years, Angioma Alliance has solicited autographed items from celebrities and sports teams and put them up for auction on Ebay. We are looking for someone who might be able to take on this project. We already have a database of names and addresses, but it would need updating. The work also involves producing a bulk mailing to these folks, collecting the donated items, listing them on Ebay, sending them to the auction winners, and sending out thank you letters to the celebrities. This project requires a substantial time commitment, but it's exciting to receive packages from the stars you know and love.

Administrative help with charity registration – For each state in which we host a fundraiser, Angioma Alliance must be recognized as a charitable organization. So far, we are recognized by Virginia and California, and will seek registration in other states as events are planned. Applying for recognition usually involves completing a series of state forms and following up where needed. We would greatly appreciate anyone who would be willing to take on this task for their own state.

Physician directory coordinator - We will be creating an international directory of physicians who are familiar with CCM and have expressed a desire to be listed publicly (see [Physician Directory](#) below). Initially, the directory will include cerebrovascular surgeons. We'll collect information about their training

and experience as well as some basic office details. We will also be attaching patient feedback from you to the listings. We need someone to coordinate this project. Initially, it may entail 5-10 hours per week of work to get out the word and enter the initial information, but this should lessen as the directory fills. The volunteer would:

1. Create an email and direct mail list of cerebrovascular surgeons using the information we provide. There are about 550 members of the cerebrovascular surgeons' professional organization.
2. Email doctors and follow-up with direct mail; our hosting company makes the email part easy.
3. Enter physician information into our database and follow up with doctor's offices if there are incomplete forms.
4. Collect patient feedback through our site and enter this into the database.

Organizing a local event or dinner party – We always welcome help with fundraising. Our fundraising committee chair Liz Neuman can help you to find a project that fits with your time and interests. Sample ideas include organizing a charity run or motorcycle ride, coordinating a group rummage sale, or hosting a benefit dinner or party in your home or elsewhere. Additionally, we appreciate anyone who writes letters to family and friends on behalf of Angioma Alliance; we provide sample letters and the forms you need to do this.

Grant Writer – We are engaging in several activities that warrant applying for foundation grants. We would greatly appreciate the help of a grant writer to create proposals.

Corporate giving – We need corporate sponsors for our upcoming family conference. If you have contact with a corporation that might be willing to become a sponsor at any level from \$500-\$25,000, we would love your help in soliciting them. Please contact us for a list of sponsorship opportunities and benefits.

Newsletter Editor – we produce an online newsletter 3-4 times a year that features news about our organization as well as the latest in research (please check the Newsletter Archives for past editions). We are looking for someone who would be willing to gather information from the contributors, perhaps write some of the news articles with our input, and turn it

into an attractive document using Word or Adobe products. We have a subscription to a web-based photo and clip art service that eases the task of finding graphic material.

Outreach to people with CCM who are in the news – As a result of Google news alerts, we're learning about more and more people with CCM through news stories. We would like someone to try to make contact with these individuals in order to tell them about us. It may take some sleuthing to obtain contact information. If the individuals are famous (lately there have been a professional boxer and a professional cyclist in the news), we'd also like to approach them to see if they might be interested in helping with public awareness of CCM.

Booklet and handout printing – We are beginning to produce patient booklets that cover special topics in CCM care. Our first booklet, Pregnancy and CCM, was a hit at the cerebrovascular surgeon's annual meeting, and we received many orders. We plan to produce at least one other booklet this year. Because these are multi-page color documents, we've been producing them on Connie Lee's computer printer to save money. We would like to find someone with a good printer and extra time that would be willing to print and assemble these. We also have a need for someone to print and staple the color handouts that we use at medical conventions. For example, for our next convention in April, we'll need 200 copies of several two or three page documents. We'll pay for inkjet cartridges and paper.

Mailings to donors – Twice a year, Angioma Alliance sends out a mailing to previous donors. We send out our Annual Report in February and a donation request in September. We would like to find someone who could take over these mailings to include printing the report and letter, printing mailing labels, and assembling the mailings. Right now, our mailing list contains about 175 names.

Web surfer – We would like our Links and Resources page to continue expanding. We are looking for someone who is willing to surf the web to identify organizations and websites that might be helpful to our members. The same person might also be able to identify books that we should be including in our bookstore section.

Family Conference Volunteer – Our family conference will be in Baltimore this year, and if you are willing to help either before or during the event, we'd love to hear from you. We would need help with registration, photography, assembling binders, and a range of other tasks.

Celebrity Spokesperson – Do you have contact with a celebrity who might be willing to become a public spokesperson for Angioma Alliance and CCM awareness? We need your help to identify and approach such a person.

Physician Directory

Angioma Alliance has been receiving many requests from our members for referrals to physicians who have expertise in treating cerebral cavernous malformations. As a result, we are developing a listing of knowledgeable cerebrovascular neurosurgeons to be posted on our site. We will include information about their training, their experience treating CCM, and office details such as the length of the wait for a first appointment or a list of insurance carriers they don't accept. A doctor's appearance on our list does not mean that we endorse them; if a doctor does not appear on our list, this does not mean that we don't believe they are a good surgeon. This is simply another piece of information for you to use as you make decisions about your care.



As an additional feature of this list, we will be asking you to provide information about your experiences with these doctors. We have developed a feedback form that we believe will allow you to give an overall perspective on your surgeon. We'll record the results anonymously, place them on the site, but also give feedback to a doctor if there seems to be a consistent problem.

We hope to begin putting the directory online in the next 3-4 months (or sooner if we can find volunteers to help – see above). If you're visiting a doctor that you'd like to make sure is included, please let us know and we'll send you a physician application form to take to your appointment.

Upcoming Chat

On Sunday, March 6 at 8:30 pm EST, 7:30 pm CST, 6:30 pm MST, 5:30 pm PST and 0130 GMT (3/7), Kristen Dehn will moderate a chat on disability and disability benefits. Kristen is a member of the Angioma Alliance board of directors who has experienced first hand the application process for both private and public disability.

We regret to say that this will be **our last chat** for now. After our first brainstem angioma chat, we've had an average attendance of 2 people for each subsequent chat. We hope to bring chats back, but in the meantime we'll be working on finding other ways to have topic-focused conversations.

Meet the Surgery Support Committee

We are happy to announce that four volunteers have formed a surgery support committee that has been moderating chats and serving as a resource for those with surgery and recovery questions. They are also working on creating pages for our site; a page entitled "Caregiver Information" has already been added. We'd like to take the opportunity to help you get to know them. The volunteers are Kelly (indykelly on the Community Forum), Tasha Scott (tasha.20), and Amy Jagemann (amy). If you would like to contact them, please use the mail or PM feature in the Community Forum. To do this, click on the Members button, and click on the member name. This feature is available also in every Community Forum post made by these individuals. The committee is also being helped by Dave and Krissi Thompson and Diana George who are reviewing web pages before they are posted.

Amy Jagemann

I underwent surgery in June of 2002 to remove a hemorrhaging cavernous angioma from the basal ganglia, part of the brainstem. I had experienced three bleeds in a matter of four months. I was 23 years old at the time and just six weeks away from my wedding.

As a member of the Surgery Support group, my goal is to create helpful information and share my experience via the Surgery Support area of the website. As a group, we are reviewing all aspects of surgery including recovery, preparation, the home environment and rehab. We feel that our experiences can help others who are going through similar experiences and maybe feeling the same way we did or encountering similar challenges.

I am now nearly fully recovered from my surgery. I have a full-time position, am in grad school pursuing an MBA and serve on the Angioma Alliance board. In my free time, I enjoy baking/cooking, exercising and travel.

Kelly

I had surgery to remove a cavernous angioma from the brainstem in June of 2003 after having two major bleeds within 3 weeks of each other. I was 41-years-old at the time. Despite what would be called a successful surgery, I am still recovering a year-and-a-half later which is much longer and more difficult than I had expected. As a result of my experiences, I am dedicated to helping others as they deal with this condition. I am eager to contribute to the Angioma Alliance as a member of the Surgery Support Group by providing any information or support that I can offer to others in order to make the process better for someone else.

I have a Masters Degree from Indiana University. I am married and have two children.

Tasha Scott

My name is Tasha Zanetta Scott, I became involved with the Angioma Alliance when my husband Sean was diagnosed with a cavernous angioma on the pons area of his brainstem. This was a very scary time for our family. Our first child was born and a few months later Sean was having surgery at UCSF to remove the cavernous angioma. His recovery was much harder and longer than any of us were prepared for. More than one year later Sean is still not fully recovered.

Currently, I work full-time writing personnel services contracts for our local County Hospital. I spend most of my non-working hours chasing our VERY active two-year-old son Devun. Sean works many long hours in his new career in Real Estate. Needless to say I have very little time for myself but... when (or if) I ever get any free time I would love to take a trip to the Napa Valley - go to the spas, wine tasting and shopping.

I really hope I can help others, especially family and friends of people with cavernous angiomas, by sharing my experiences with surgery and surgery recovery.

Angioma Alliance in the UK

We are pleased to announce the formation of an Angioma Alliance branch in the UK founded by Ian Stuart. Ian believes passionately in the work of Angioma Alliance both in the USA and, with your help, in the UK. Some of the things that Ian wants to share with a UK group:

- To form a supportive group of angioma sufferers
- Introduce a network across the country of individuals who share a common objective of living with, through or after the condition's appearance.
- Explore common symptoms: fatigue, stress, pain, anger, depression, sleep deprivation and organise ways of coping.
- Establish regional centres that interact with local hospitals, doctors and surgeons
- Provide strategies on how to cope and deal with the labyrinthine bureaucracy and structure which is the National Health Service.
- Arrange meetings and conferences designed to educate ourselves and assist our situations and allows us to help physicians understand our needs.
- Serve as a public education resource to heighten the public's response and awareness of angiomas
- Through a series of fundraising events activities allow ourselves to operate independently and free of financial constraints.



Ian Stuart was 26 and in the middle of doctoral studies when he was diagnosed with a cavernous brainstem angioma. His symptoms which are, to this day, progressively worsening, are a Holmes Tremor to the right side especially in the right arm; dysarthria (slurred speech); diplopia (double vision on extreme gaze); and gait ataxia (mobility difficulties.) After completing the Ph.D., Ian taught at the University of Southern California in Los Angeles. After two further years of teaching on the East Coast of America, he returned to England in 2002 where he "chose" to live with the condition. As Stuart has observed, "only time will tell whether I have chosen wisely."



Where We Are Exhibiting

In early February, we exhibited at the American Academy of Neurological Surgeons/Congress of Neurological Surgeons Cerebrovascular Section joint conference with the American Society of Interventional & Therapeutic Neuroradiology. The purpose of our participation in this conference was to promote awareness of our organization among cerebrovascular surgeons so that they may refer their patients to our resources and to the research projects of our advisors. Our alliance with Dr. Pozzati, described in the Patient Registry article above, was a direct result of our presence at the conference. In addition, the conference gave us the opportunity to begin collecting names for our upcoming Physician Directory.

In April, Angioma Alliance will exhibit at the American Academy of Neurology annual convention in Miami. This is our second year at the convention, and we are looking forward to the opportunity to give information about CCM and Angioma Alliance to the neurological community. Last year, we discovered that our exhibit was visited by a number of knowledgeable neurologists and by an even greater number of neurologists who were not familiar with CCM. Our presence was much needed. This year we will be fortunate enough to have the presence of board member Norma Villa who will help Spanish-speaking physicians learn about us and our resources.

Family Conference 2004 DVDs

We still have limited quantities of DVD sets of the presentations by leading researchers given at our family conference last year. In addition to a question and answer period, here are the topics and presenters:

Cavernous Malformation, Venous Malformation and Capillary Telangiactasia – Dr. Richard Clatterbuck
Technological Advances – Impact on Cerebrovascular Surgery – Dr. Hunt Batjer
Cavernous Malformations and Clinical Decision-Making – Dr. Issam Awad
Rehabilitation – Dr. Elliot Roth
CCM Genetics and Genetic Testing – Dr. Doug Marchuk and Tracey Leedom
Future Directions for Research – Dr. Murat Gunel

These presentations are far more interesting and informative than their titles might lead you to believe. Particularly if you can not attend this year's conference, you shouldn't miss the information here.

DVD sets are a bargain at \$30 and include approximately 5 ½ hours of video. To order, please write us at info@angiomaalliance.org to make sure there are still copies available, and we will send you payment information.

Family Conference Sponsors

We need corporate sponsors for our national family conference in Baltimore (see article above). If you have contact with a corporation that might be willing to become a sponsor at any level from \$500-

\$25,000, we would love your help in soliciting them. We offer the following sponsorship levels and benefits:

Conference Sponsor.....\$25,000

(Sponsorship of all conference activities)

- Exclusive recognition in all press releases and publicity regarding the conference
- 10 minute opportunity to address the audience (contents of speech must be approved by Angioma Alliance)
- 10'x10' exhibit space to display and distribute company materials in general session
- Company publicly thanked and recognized from the podium
- Back cover advertisement on conference binder
- Name and company logo on all conference materials
- Announcement and company logo on the Angioma Alliance website and online newsletter

Family Sponsor.....\$10,000

(Scholarship/housing fund for attendees needing financial assistance)

- Large banner with company name and logo in general session (Plaza B) during the entire conference
- Full page advertisement in conference binder
- Table space to display and distribute company materials
- Company publicly thanked and recognized from the podium
- Company name and logo on all conference materials
- Announcement and company logo on the Angioma Alliance website and online newsletter

Speaker Sponsor.....\$7,000

(Sponsorship of travel and housing expenses for speakers)

- Company name and logo displayed on a banner at the speaker's podium
- Full page advertisement in conference binder
- Table space to display and distribute company materials
- Company publicly thanked and recognized from the podium
- Company name and logo on all conference materials
- Announcement and company logo on the Angioma Alliance website and online newsletter

Reception/Break Sponsor.....\$5,000

(Sponsorship of evening reception and breaks between sessions)

- Table tent recognition at all refreshment tables
- Full page advertisement in conference binder
- Table space to display and distribute company materials
- Company publicly thanked and recognized from the podium
- Company name and logo on all conference materials
- Announcement and company logo on the Angioma Alliance website and online newsletter

Children's Program Sponsor.....\$2,500

(Sponsorship of childcare activities and children's food/beverage)

- Company name and logo displayed on a banner at the entrance to the children's program area
- Full page advertisement in conference binder
- Table space to display and distribute company materials
- Company publicly thanked and recognized from the podium
- Company name and logo on all conference materials
- Announcement and company logo on the Angioma Alliance website and online newsletter

Individual Speaker Sponsor.....\$1,000

(Sponsorship equivalent to airfare, meal and lodging expense for one speaker)

- Table space to display and distribute company materials

- Company publicly thanked and recognized from the podium
- Company name and logo on all conference materials
- Announcement and company logo on the Angioma Alliance website and online newsletter

General Sponsor.....\$1,000

(Sponsorship of general expenses such as conference binders, shipping, printing, office supplies, etc)

- Table space to display and distribute company materials
- Company publicly thanked and recognized from the podium
- Company name and logo on all conference materials
- Announcement and company logo on the Angioma Alliance website and online newsletter

Individual Family Sponsor.....\$800

(Sponsorship equivalent to lodging/registration expense for one family)

- Company publicly thanked and recognized from the podium
- Company name and logo on all conference materials
- Announcement and company logo on the Angioma Alliance website and online newsletter

Audio Visual Sponsor.....\$500

(Sponsorship of all technical equipment for speakers)

- Company publicly thanked and recognized from the podium
- Company name and logo on all conference materials
- Announcement and company logo on the Angioma Alliance website and online newsletter

Cerebral Cavernous Malformations Imaging and Diagnostics I

by Jack Hoch

This is the first of three medical imaging articles aimed at covering the nuts and bolts of procedures available to patients for diagnosing brain lesions.



Medical diagnostic imaging is a complex field requiring highly trained and specialized medical professionals to administer these procedures and interpret the results. As technology and understanding of disease pathology evolves, combinations of diagnostic images are being used in an integrated and layered approach. In some cases, imaging technology, which has been around for a decade or more, is being altered and used in new ways. This can make the testing process easier and less invasive or lead to new approaches in the diagnosis of a disease.

This article's purpose is to describe the two most common imaging technologies and their use in the cavernous malformation diagnosis process.

Computed Tomography (CT/CAT Scan)

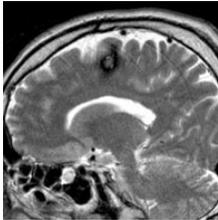
For many years, the first line of diagnosis was the computed tomography (CT), or "CAT Scan" (the "A" in "CAT" stands for "axial", meaning looking at one's head from the top down). CT is a technology that has been in use for roughly 30 years, and has improved with time.

Initially slow and prone to patient movement artifacts, getting a sharp and detailed image was problematic. Regardless, it was worth the time and trouble because the process was non-invasive and gave doctors a good look at the soft tissue structures of the brain. CT is still widely used today,

especially in emergency rooms where trauma doctors need to get a first look at a patient's problem. It helps that CT is less expensive than MRI, and it's also adept at imaging fresh blood.

Drawbacks are that it uses x-rays to create the resultant image, and the image detail is less than other technologies. Like MRI, CT may include the use of a contrast agent (dye) to enhance certain aspects of the image. Patients who don't like needles won't appreciate this portion of the test, but at least it's only a single injection.

Magnetic Resonance Imaging (MRI)



MRI is the gold standard in diagnostic imaging. Invented in the late 1980s, MRI has revolutionized the diagnosis of certain diseases, including cavernous malformation (CCM). While the images it produces appear similar to those produced by CT, the process by which these images are rendered is completely different.

There are two physical types of MRIs: open and closed. Close MRIs require the patient to enter a very narrow tube, and lie flat and still during the procedure which can take 30 minutes or more. For those who are claustrophobic, it can be a nightmare.

Open MRI's are not comprised of a closed tube, so there are really no problems for claustrophobic patients. There is, however, a trade-off. In most cases, open MRIs are less precise than their closed counterparts. If a patient can handle the claustrophobic aspects of a closed MRI, then a closed MRI is the optimal procedure to undergo.

An MRI develops a very strong magnetic field resulting from the generation of radio waves focused at a certain part of the body. As of now, there are no known health problems from the occasional exposure to high strength magnetic fields, certainly nothing as conclusive as there is with x-ray used in CT scanning.

MRIs are also noisy, requiring hearing protection. No metal objects are allowed in the actual MRI room. Due to the high strength magnetic field, certain patients cannot undergo an MRI if they have an implanted pacemaker, or metal plates or screws surgically inserted somewhere in the body. Although there are no preparation requirements (such as fasting, other restrictions, etc.) that must be met before the procedure, there is a requirement that the patient remain absolutely still during the imaging portion of the exam. Movement will result in blurred, useless images.

Like CT, MRI generates an image "slice by slice". These slices are normally a few millimeters thick, so that the rendered image is detailed and clear. Likewise, the slicing orientation is controlled by the technician: axial (top of head looking down; coronal (back of head looking forward), and sagittal (side of head, looking toward other side of head). MRI scans can be run with a multitude of settings, depending upon the expected results and location of the mass or entity to be studied.

The garden variety MRI is the spin-echo MRI. Spin-echo refers to the type of MRI pulse that is used during the procedure. There are different weightings and spin-echo sequences that radiologists will use depending upon the individual case. Without getting excruciatingly technical (because MRIs are exceedingly complicated), there are two weightings of spin-echo images which are most widely used:

T1 – Longitudinal relaxation time – hemorrhages, especially newer ones, appear brighter than surrounding brain tissue

T2 – Transverse relaxation time – hemorrhages appear darker than surrounding brain tissue.

Please keep mind that both T1 and T2 times are adjustable by the radiologist, so that the best contrast relative to background brain tissue can be depicted. Again, the settings will be optimized for the expected location of study in the brain, as well as the type of finding expected. In those cases where a brain scan is ordered without pre-existing knowledge of

lesion, general “template” T1 and T2 settings are used to have the best chance of picking up abnormalities.

Gradient-echo differs from spin-echo and allows detection of very small (punctuate or pin-sized) abnormalities. This is especially critical for potential cavernous malformation patients, as even small lesions can have big neurological consequences. Especially for one’s first diagnostic scan, when the root cause of clinical symptoms is unknown, **getting a gradient-echo MRI is a must**. When in doubt, be sure to ask that “gradient-echo” be specified by the MRI prescription issued by the referring doctor.

There are additional MRI sequences, such as turbo (fast) spin-echo and functional MRIs, among others. Turbo spin-echo is simply a quicker way of accomplishing a regular spin echo scan, yielding certain advantages (and disadvantages). Functional MRI is very useful in certain pre-surgical situations. These and other diagnostic tests, such as angiography, will be highlighted in a future article.

Limitations of Imaging and Upcoming New Technology

It’s been established that people who suffer from claustrophobia, possess metallic implants, or can’t stay still may have a hard time undergoing a successful MRI examination. What about children? Young ones can also experience serious medical difficulties requiring diagnostic examination. Trying to keep kids from squirming during a 30 or 45 minute MRI procedure is practically impossible. Use of immobilizing duct tape is not a realistic solution either!

General anesthesia has been the fallback, but this is tough on the kids, not to mention their parents. If you’ve ever seen a preschooler regaining consciousness from an anesthesia-based procedure, it’s an eye opener. There are side-effects, such as headache, and other dangers. For a non-invasive procedure, anesthesia seems like overkill, but until recently it was the only realistic alternative.



Fortunately, new technology is on the horizon that hopefully will relegate general anesthesia to the trash bin for follow-up pediatric MRIs. General Electric has recently received approval to use its “Propeller” imaging technology. While we don’t want to sound like an advertisement, it appears that this device reduces the negative effects of motion, resulting in high definition scans even with a squirmy kid. This means that many young children will no longer require sedation to undergo follow-up MRIs. Also, the overall Propeller process is quicker, possibly cutting the exam duration by 40 or 50%. Since Propeller uses turbo spin-echo sequences, it may not be the best choice for an initial scan, but it could be a great choice for follow-up and “expectant management” of CCMs.

Right now, Propeller installations are primarily in the upper Midwest. Propeller is part of a software upgrade to already existing GE MRI scanners, and thus does not require the purchase of new hardware. It may be possible that with encouragement your local imaging facility may upgrade as well. Here is a list of the currently installed sites:

Illinois:

Carle Clinic, Champaign
Children’s Memorial Hospital, Chicago
Ingalls Memorial Hospital, Chicago
Memorial Hospital, Springfield
Central DuPage Hospital, Wheaton

United Hospital, St. Paul (will get Propeller in April)

Nebraska:

Methodist Hospital, Omaha

New York:

Columbia Presbyterian, NYC

South Dakota:

Avera McKennon Medical Center, Sioux Falls

Minnesota:

Mercy Hospital, Coon Rapids
Fairview Southdale Hospital, Edina
Unity Hospital, Fridley
Mayo Clinic, Rochester
Center for Diagnostic Imaging, St. Louis Park
(will get Propeller in April)

Washington:

Seattle Radiologists, Seattle

March 2005 Latest Research Summary

By Connie Lee; Reviewed by Dr. Issam Awad

Gamma Knife

There were four articles on gamma knife surgery in the treatment of cavernous malformations published in the last three months including a special supplement of studies in the Journal of Neurosurgery. These articles followed large groups of patients (30-125) over time to explore the impact of gamma knife surgery (GKS) on the lesions. In general, the articles were positive about the use of gamma knife surgery in certain circumstances. Here are some of the findings:

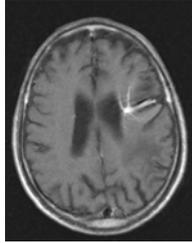


- 1) All of the studies agreed that lower doses of gamma radiation (average was below 15Gy) were better at reducing the risk of radiation related complications. However, one study questioned whether these lower doses were as effective in treating the lesions themselves [3]. Two studies noted a high rate of post-GKS edema (in 26% of patients) which sometimes led to neurological deficits [1,2], while the other two did not mention edema at all. It was noted that edema occurred more often in patients who had prior surgery to their lesion, had larger lesions, or who were treated with radiation doses higher than 13 Gy.
- 2) The studies examined several possible desired outcomes: seizure control, lowered re-hemorrhage rate, reduction in neurological deficits, and reduction in lesion size. These outcomes seemed to vary depending on the characteristics of the person or the lesion.
 - a. Seizure control – GKS helped with seizure control if GKS occurred within 6 months of a patient's first seizure [1,4]. For many of these patients, it took 3 years post GKS for better seizure control to be achieved [1]. Better seizure control was also associated with larger lesion size [2]. Another study noted that within the first 2 years post-surgery, 79% of individuals who received traditional surgery remained seizure free, while only 25% of those who received GKS did so[3].
 - b. Re-hemorrhage rate – Annual re-bleeding rates were highly variable across studies. Annual rates during the first two years post GKS ranged from 0% [3], 1.6% [2], 2.3% [1], to 10.3% in the largest study [4]. An annual re-bleeding rate of 2% is what would be expected with no treatment. All studies showed a drop in re-bleeding rate after two years, although this is comparable to what one would expect with untreated lesions. One study noted that GKS may be most useful for those who have inaccessible lesions that have bled multiple times. However, they also note that re-bleeding rates after GKS in their study were higher for middle-aged patients, females, those with a history of bleeding, and those with larger lesions [2] compared to others who receive GKS.
 - c. Neurological deficit reduction – Only one of the four studies explored neurological deficits. In this study, neurological symptoms improved in 33% of patients in the first 7 months after GKS. However, at 9 months, 20% of all patients developed additional neurological symptoms and for 25% of these individuals, the new deficits became permanent. This worsening of neurological deficits was more frequent in patients under 30 and those who had had previous surgery on their cavernous malformation [2].
 - d. Reduction in lesion size – There was no difference in the number of lesions that decreased in size compared to what happens to cavernous malformations that are not treated (40-45% were smaller after 2 years [1,2,3]). However, there was a significant difference in lesion growth with only 1.8% of cavernous malformation growing in the two year period post GKS (compared to 35-43% of cavernous malformations that are not treated) [2].

In summary, gamma knife surgery can lead to favorable outcomes in selected cases with cavernous malformations. However, none of the studies allows any meaningful comparison to the course of the lesions compared with those that are left without treatment. If gamma knife surgery is considered, patients must be selected very carefully, with the results of the above studies in mind, especially regarding lower doses of radiation than typical radiosurgery procedures. Complication rates are quite

high, raising concerns that radiation may in fact worsen aggressive behavior in the lesions, at least in the short term. This information cannot be used to endorse widespread use of radiosurgery for this lesion, or for associated epilepsy. It still appears that traditional surgery, where possible, produces better outcomes than gamma knife surgery with a similar risk of complication (5% overall).

Venous Malformations



Three studies examined the role of venous malformations (venous angiomas or developmental venous anomalies) in the formation and behavior of cavernous malformations. The first was a case report documenting the formation of a cavernous malformation next to a venous malformation [5]. The second was a poster presentation in which the authors used perfusion studies, which measure blood flow dynamics around a venous malformation, to predict which venous malformations are likeliest to cause the development cavernous malformations [6]. Finally, a third study examined hemorrhage rates of cavernous malformations. They determined that patients with cavernous malformations that are located near a venous malformation or that exhibit abnormal venous drainage are almost twice as likely to present with hemorrhage. Abnormal venous drainage could not be identified reliably with MRI; in 90% of cases digital subtraction angiography was required [7]. However, it is not clear whether the abnormal venous drainage may have been caused the cavernous malformation hemorrhage itself. The findings of this study seem to contradict a previous study that examined hemorrhage rates of cavernous malformations associated with a venous malformation versus cavernous malformations that were not [8]. This study found that there was no difference in hemorrhage rate between the two types of cavernous malformations. If the current study is validated by others, this research could have very important implications in the process of deciding which cavernous malformations are most appropriate to treat surgically.

The Two Hit Theory

Those who have the familial form of CCM have one copy of a gene (KRIT1, CCM2, CCM3 or a currently unidentified CCM4 gene) that has mutated and is no longer functional. This mutation by itself does not cause the formation of a cavernous malformation since every individual has two copies of each gene. Researchers have been examining cavernous malformation tissue to see if they can find cells within the lesion that have a mutation on the second copy of the familial gene. A recent study out the lab of Dr. Gault and Dr. Awad at the University of Colorado identified cells within a surgically removed cavernous malformation that had a mutation in the first and second copy of the KRIT1 gene. This is important because it validates a “two hit” theory as one mechanism for cavernous malformation formation. As cavernous malformation formation is better understood, treatment models can begin to be developed [9].

Sleep and Cavernous Malformations in the Pons

A recent study examined the effect of lesions in the pons on rapid eye movement (REM) sleep. REM sleep is the stage in sleep during which we dream, and it is thought to be involved in learning and memory formation. The researchers found that even in individuals with cavernous malformations in the pons who did not have complaints about sleep, REM sleep was dramatically reduced. This sleep stage disruption may explain some of the cognitive effects of these lesions. Unfortunately, although we can increase the length of overall sleep time with medications, there is as yet no way to increase REM sleep pharmacologically [10].

Case study: Itch and Spinal Cord Malformation

Itch that is caused by a lesion in the spinal cord is very rare – only 10 cases from any cause have ever been reported. However, three of these ten were caused by cavernous malformations even though cavernous malformations comprise only 5% of spinal cord lesions. With such a small sample, it is difficult to reach any conclusions, but it is possible that the nature of cavernous malformations, most especially the hemosiderin rim may make this symptom more likely with cavernous malformations than with other types of lesions [11].

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