

Brain Stents

Artery Allies

Department of Neurosurgery



**University of Michigan
Health System**

Introduction

Brain stents are devices implanted in the brains of people with high risk conditions of the brain arteries.

Brain stents save and improve lives every day, and University of Michigan specialists have developed great expertise in their use.

Our team includes neurosurgeons and Neuro Interventional Radiologists (doctors with expertise in x ray guided brain procedures) as well as nurses and other health professionals. We prepared this booklet to offer some clarity about these essential devices and their related aspects.

Table of Contents:

What is a stent.....	3
When do we use brain stents?.....	3
What is a brain aneurysm?.....	3
What is intracranial stenosis?.....	6
What are the risks?.....	7
How will having a stent in my brain affect my life?.....	7
What kind of tests do I need.....	8
Imaging.....	9
Blood tests.....	9
In conclusion.....	9
Appendices.....	11
Taking clopidogrel (Plavix®) Safely.....	11
Stroke Warning Signs.....	13

What is a Stent?

A good way to think about a stent is like a retaining wall inside an artery.

While stents are not solid like an actual wall, they do what walls do by protecting an inner space from invaders or from being squeezed shut.

Brain stents are small tubes that range in diameter from about soda straw size down to a piece of spaghetti. The stents are placed into brain arteries to keep the blood flow strong.

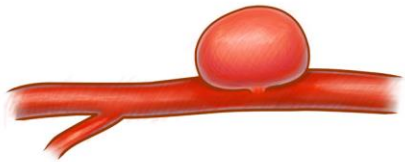
Stents are tubes made of wire mesh that is capable of expansion. The mesh is made of nitinol, a blend of nickel and titanium. When it is first inserted into a patient's artery, the stent is packed within a wrapper. After the doctor advances the stent to the ideal position, he draws the wrapper back and the mesh expands to fit snugly against the vessel's inner wall.

When do we use brain stents?

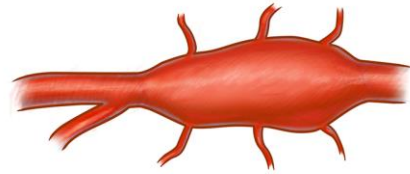
Stents have two main uses in the brain. They are used to treat brain aneurysms, and also to maintain blood flow in narrowing blood vessels. This second condition is called Intracranial Stenosis

What is a brain aneurysm?

An aneurysm is a weak area in the wall of a brain artery that bulges out like a balloon, usually in the shape of a berry or blister. An injury, infection or an inherited tendency may start an aneurysm that grows silently over time. Smoking and high blood pressure increase the risk of having an aneurysm.

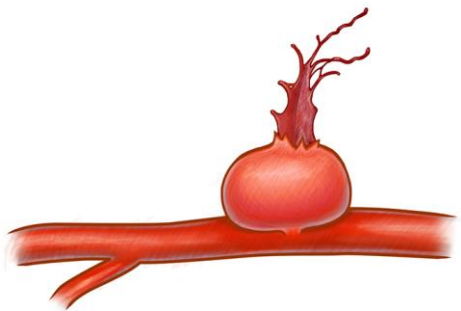


Saccular Aneurysm



Fusiform Aneurysm

Eventually the bulge may stretch and cause the vessel's wall to get thinner and thinner until it breaks. This is called a rupture. A rupture may cause devastating brain injuries that lead to major disability.



Ruptured aneurysm.

Aneurysm coiling is a procedure that can be very effective in preventing or limiting the impact of a rupture. Patients with aneurysms may benefit from this procedure if the aneurysm size or vessel size falls within a specific range.

For aneurysm coiling, the surgeon or radiologist inserts a very thin, highly flexible tube called a catheter into an artery, usually in the groin. The doctor threads the catheter through the arteries until it reaches the aneurysm. The doctor then uses the tube to deliver coils into the aneurysm until it is filled with them.

These coils reduce blood flow and cause a clot to form, sealing the aneurysm from inside.

Most often stents are used to support this coiling process when the aneurysm has an unusual shape.

If an aneurysm has a wide neck, the coils needed to seal it can easily float out. This not only means that the aneurysm is not getting fixed, but there is also a danger of traveling coils causing strokes deeper within the brain.

When a stent is first positioned at the base of the aneurysm, it can act as a kind of “backstop”. The coils are then fed through the mesh and into the aneurysm. In this way the stent secures the coils, making sure they stay in place. Using this “backstop” technique makes it possible to treat aneurysms that were often untreatable in the past.

To view a video demonstration of how the stent is deployed visit:

<http://careguides.med.umich.edu> and type the keyword “coiling” in the search box.



Treating an aneurysm with coils and a stent

What is Intracranial Stenosis?

Stenosis means “narrowing”. Intracranial stenosis occurs when plaque builds up within an artery that supplies blood to brain tissue. This buildup causes narrowing of the artery and can lead to stroke.

Some patients who have intracranial stenosis have good results with medications like aspirin and blood thinners and by making lifestyle changes. Stent placement is recommended for those having symptoms from severe intracranial stenosis that have not been improved by medical treatment. Severe intracranial stenosis is defined as 70% blockage or more.

Treating intracranial stenosis with stents is often done along with cerebral angioplasty. Cerebral angioplasty is another procedure that begins with a doctor routing a catheter into an affected brain artery. In this case, the angioplasty catheter is one that has an expandable balloon near its tip. Once the catheter is positioned within the area of stenosis, the physician expands the balloon, pressing back the narrowed arterial walls and improving the passage of blood.

After this treatment, a stent may be placed to keep the passage securely open. The stent’s more rigid form prevents “cave-ins” or re-closing the artery from surrounding pressure.



Stent helps to keep artery open

What are the risks?

Just like any medical procedure, brain stent implantation can carry risks of complications. These include but are not limited to:

- artery puncture
- stent movement
- damage to the lining of the vessel causing an artery dissection
- bleeding into the brain
- stroke from artery blockage

When considering these risks, doctors and patients must weigh them against the risks of not having a stent placed. For example: patients with 70% to 99% stenosis that are treated with medications alone have a high rate of stroke. Untreated aneurysms have the potential to rupture as discussed above. We encourage you to talk with your doctor about the options, risks, and potential benefits of brain stents in your individual situation.

Brain stents cannot be implanted in people who:

- are not able to take blood-thinning drugs to help prevent blood clots
- have blockages in arteries that cannot be accessed with a catheter because of their anatomical structure

How will having a stent in my brain affect my life?

Stents can improve and even save lives, but having a stent does bring some new precautions into the life that's saved.

Having a stent can make you **prone to bleeding. Caution is crucial.**

Since a body's usual reaction to a stent would be to coat it with blood clots, your doctor will prescribe drugs to keep its surface clear. These medications,

also called “blood thinners” will include aspirin and Plavix® (clopidogrel), and they increase your risks for bleeding anywhere in the body.

Blood thinners may be needed for a long or short time period. It is important that you are faithful in **taking them as prescribed**. Interrupting this therapy will drastically increase your risks of a stroke. (A list of stroke signs and symptoms is available at the end of this booklet).

While you are on these medications, avoid situations that increase your risks for cuts or trauma. Be quick to have any injuries to the head checked out thoroughly. And be sure any other doctor or dentist you are seeing knows that you are taking these medications.

Refer to Appendix 1 of this booklet to see a detailed list of things to keep in mind while taking Plavix®.

This stent is an implant, carry your card.

Having an implanted device brings questions and responsibilities.

Many patients wonder “Will I set off metal detectors?” or “Will my stent rust?” or “Will I be in danger having an MRI?”

Since current stents are made of *nitinol* (a blend of nickel and titanium) the answer to all these questions can be “no”. Still, it will be crucial that you carry your implant ID card at all times. Since there are many different types and ages of stents in the world, this card will be the most reliable source of truth about yours.

What kinds of tests do I need?

Imaging

To be sure that the stent remains in good position and continues holding the artery wide open, you will need to have a follow up angiography test 6 months after placement. Further imaging is typically done after another 6 months with future studies considered at that time if needed.

Having a stent does not create any complications with having X-rays, angio studies, or CT scans. All the stents used here are MRI compatible.

Blood tests

The aspirin and Plavix® therapy required by your stent works by slowing down the early stages of blood clot formation. For a clot to form, blood cells called platelets must first gather together and begin a chain reaction. These drugs reduce (inhibit) the platelets' ability to begin this first step, and testing is needed to insure the amount of inhibition is safe and effective.

To insure your body is responding adequately to these drugs, we will do the P2Y12 Platelet Function blood test prior to stent placement. Your doctor will decide how often you need testing after the stent placement

In Conclusion

We hope this booklet has provided you with some greater clarity and increased comfort as you adjust to living with a stent.

While we tried to anticipate most of the typical questions, please feel free to approach any member of the care team if you have any additional ones. We pride ourselves in being a place that provides knowledge as well as care.

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Author: Steven Senne BSN, RN

Reviewers: William Stetler, MD, Mary Jo Kocan, MSN, RN, CNRN, CCRN

Jody Wasielewski BSN, RN, MBA, Tiffany Tan Hoang, BSN, RN

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Appendix 1

Taking clopidogrel (Plavix®) Safely

Be sure to take this medication **exactly as prescribed** by your doctor. Faithfully follow the directions on your prescription label.

This medication is used to reduce how fast your body forms blood clots. While that effect helps keep your stent clear and open, it also means that you are prone to bleeding and must be aware of signs of bleeding or other circulatory disturbances.

Stop using Plavix® and call your doctor at once if you have any of these serious side effects:

- Nosebleed or other bleeding that will not stop
- Bloody or tarry stools, blood in your urine
- Coughing up blood or vomit that looks like coffee grounds
- Sudden numbness or weakness, especially on one side of the body
- Sudden headache, confusion, problems with vision, speech, or balance
- Pale skin, weakness, fever, or jaundice (yellowing of the skin or eyes)
- Easy bruising, unusual bleeding in the nose, mouth, vagina, or rectum
- Purple or red pinpoint spots under your skin

Other instructions while taking clopidogrel include:

- Clopidogrel can be taken with or without food.
- Avoid drinking alcohol. It may increase your risk of bleeding within your stomach or intestines.
- Drinking grapefruit juice while taking clopidogrel may reduce its effectiveness.

- While you are taking clopidogrel, do not take aspirin or other NSAIDs (non-steroidal anti-inflammatory drugs) unless your doctor has prescribed them. NSAIDs include, but are not limited to:

- Advil®
- Aleve®
- Cataflam®
- Celebrex®
- celecoxib
- diclofenac
- ibuprofen
- Indocin®
- indomethacin
- meloxicam
- Mobic®
- Motrin®
- Naprelan®
- Naprosyn®
- Naproxen®
- Treximet®
- Voltaren®

Other medications to avoid while taking Clopidogrel include: omeprazole (Prilosec®) or esomeprazole (Nexium®).

This list is not complete. Not all interactions are listed here. Other drugs may interact with clopidogrel, including prescription and over-the-counter medicines, vitamins, and herbal products. Your best protection is to be sure that everyone suggesting or prescribing medicines to you knows you are taking clopidogrel. In addition, mention that you are taking Plavix® to the pharmacist whenever you pick up a new prescription.

Typically people on Plavix® stop taking the medication for 5 days before any elective surgery or any dental work that could cause bleeding. **Talk with your doctor** if any such procedure is recommended for you. You and your doctor should carefully consider the value of the suggested procedure versus the major risks of stopping Plavix® therapy.

Appendix 2

Stroke Warning Signs

Sudden onset of:

- Difficulty with speech
- One side of the face drooping or feeling numb
- Weakness or numbness on one side of the body
- Unexplained clumsiness or falling
- Sudden severe headache

If you or someone you know is having these signs, call 911 or have someone get you to the nearest emergency room immediately.