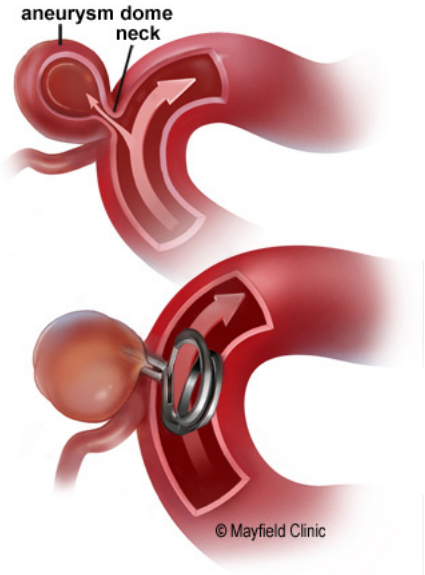
PREMIER NEURO SPINE INSTITUTE
INNOVATIVE BRAIN AND SPINE CARE

ANEURYSM CLIPPING AND COILING

CANDIDATES FOR AN ANEURYSM CLIPPING OR COILING

A brain aneurysm is a balloon-like bulge that develops in the wall of its parent artery. As the aneurysm grows, the artery wall weakens and the aneurysm may leak or rupture, causing blood to release into the brain. Most aneurysms are saccular, meaning they are shaped like a balloon with a small neck expanding into a dome. These are the easiest aneurysms to treat. Others have a wider neck or no definable neck, at all, known as fusiform. These are more difficult to clip or coil and may require stenting.



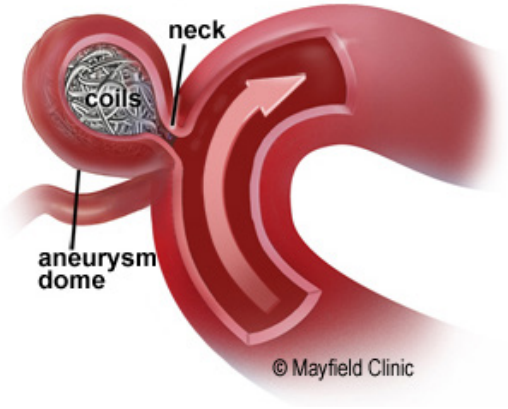
The treatment for an aneurysm will depend on the shape of the aneurysm itself, its location and the overall health of the patient. Clipping the aneurysm at its neck is an invasive procedure and may not be recommended for patients who are older and in poor health. Coiling is a noninvasive procedure, however, the longevity of a coil is less definitive than that of a clip. When deciding upon the course of treatment (observation, clipping or coiling) the risk of rupture of the aneurysm must be weighed.

WHAT IS AN ANEURYSM CLIPPING OR COILING?

Aneurysm clipping and coiling are two separate methods of treating an aneurysm. The strategy for either option will also differ if the aneurysm has ruptured versus if it has not. If the aneurysm has ruptured and is bleeding into the brain, known as a subarachnoid hemorrhage (SAH), the timing of the treatment is very important and is usually completed within 72 hours of the first bleed as the risk for repeated bleeding is 22% within the first 14 days. An SAH may also result in narrowing of the artery, or vasospasm. There is a 40% risk of death and 80% risk of disability when an aneurysm ruptures.

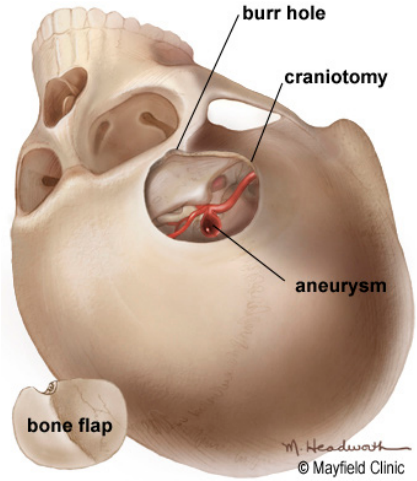
If the aneurysm has not ruptured, symptoms may not be present and it may have been detected through routine testing for other conditions. There is less risk associated with an unruptured aneurysm (about 1% risk of rupture per year) but risk may vary depending on the size, shape and location of the aneurysm.

Therefore, treatment strategies will vary.



If clipping is the method of treatment and the aneurysm has not ruptured, certain preparations will be made prior to surgery including relevant tests, stopping medications, refraining from smoking and drinking alcohol, and not eating or drinking after midnight the day before surgery. The procedure will be performed under general anesthesia and will typically take 3-5 hours.

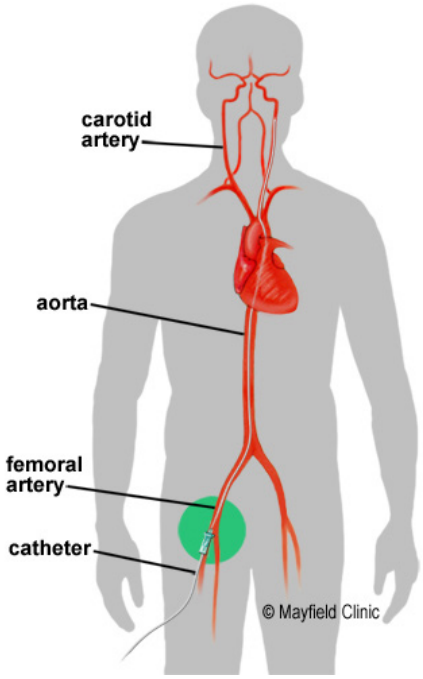
Once the patient is asleep, his or her head is placed in a three-pin skull fixation device attached to the operating table to prevent movement. The incision area is prepped and a lumbar drain may be placed in the lower back to remove cerebrospinal fluid in order to relax the brain. An incision is made to the scalp and muscles to reveal the skull. A craniotomy is performed to remove a portion of the skull known as a bone flap, in order to access the brain and locate the aneurysm. Once the aneurysm is located, the surgeon will obtain control of the blood flow and prepare the neck of the aneurysm for clipping.



The aneurysm must be isolated and small surrounding arteries must not be included in the clip. The clip is held open with a tweezer-like applier until the correct positioning is found. Once the clip is placed, the surgeon will ensure it is not narrowing the parent artery and that no additional arteries were clipped. The titanium clip will remain in place permanently and several clips may be used. The surgeon will then check the aneurysm to be sure it is no longer filling with blood.

Once the clip is in place and checked, the surgeon will then close the craniotomy and replace the bone flap with titanium plates and screws. The muscles and skin are sutured back together to close the incision and a dressing is placed over it.

The same preparations are made when undergoing a coiling procedure in which the aneurysm has not ruptured. During the procedure, the patient lies on his or her back and is given general anesthesia and anti-clotting medication. The patient's head is positioned so that it won't move during the procedure. The area of injection is prepped and the femoral artery in the groin area is located. The entire procedure typically takes 2-4 hours.



A hollow needle is inserted into the artery and then a catheter is passed through the needle to enter the bloodstream. Dye is injected through the catheter to make blood vessels visible on the x-ray monitor. Using the x-ray visuals, the surgeon guides the catheter through the bloodstream up the aorta, passing the heart and entering one of the four arteries in the neck that lead to the brain. Once the catheter is correctly placed, the surgeon continues to inject the dye to map and measure the arteries and aneurysm.

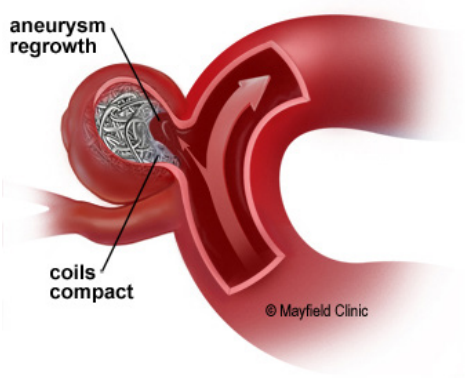
A smaller catheter is inserted through the first catheter up into the aneurysm, through which platinum coils are inserted into the aneurysm. The surgeon maintains visuals by continuing to inject dye to ensure the placement of the coils. Once the coils are properly placed, the surgeon then releases them and continues packing the aneurysm with coils. A stent, or mesh tube, may be necessary to hold the coils in place. Once all coils are placed and the surgeon confirms proper blood flow, the catheters are removed. Pressure is applied to the injection site in the groin area to prevent the artery from bleeding.

If the aneurysm has already ruptured, there is no time for the aforementioned preparations. The patient is stabilized so the providers may locate the hemorrhage. The patient may immediately be taken into the operating room and given medication to decrease blood pressure, put on a breathing machine or sedated.

RESULTS OF AN ANEURYSM CLIPPING OR COILING PROCEDURE

Aneurysms that have been completely clipped are not likely to grow back, however, if the aneurysm was only partially clipped, the patient will need to undergo periodic angiograms to ensure the aneurysm is not growing.

If the aneurysm was coiled, long-term results are about 80-85% effective. About 20% of patients experience recurrence due to the coils not completely blocking the aneurysm or becoming compacted.



The aneurysm should be checked regularly to measure regrowth and if a major portion of the aneurysm does regrow, the patient may require another surgery. Additional coils or a clip may be placed to stop the growth. About 5-10% of patients will need a second surgery.

Due to the risk of regrowth in coiling patients, surgeons will typically recommend the patient returns after six, 12 and 24 months for an angiogram. If the aneurysm ruptured, the patient should return after three months.

Most patients who undergo an aneurysm clipping or coiling of an unruptured aneurysm can expect to live normal lives. If the aneurysm has ruptured, recovery may be more difficult with challenges ranging from minor to more severe. Short-term memory loss and headaches are common. Some deficits may lessen through healing and therapy.

Most modern aneurysm clips are made of titanium and won't be detected in a security scan. However, it is important to know the compatibility of the clip with an MRI machine before undergoing an MRI scan.

WHAT ARE THE RISKS OF AN ANEURYSM CLIPPING OR COILING?

Aside from the ever-present risks of surgery, complications of an

aneurysm clipping or coiling center around the regrowth or rupture of the aneurysm. The risk of vasospasm, stroke, seizure, bleeding and imperfect clip or coil placement are present. Brain surgeries also risk infection, allergic reactions to anesthesia and swelling of the brain.

PRE AND POST-PROCEDURE INSTRUCTIONS

Pre-Procedure:

1. You will need to complete a medical clearance and/or lab work prior to surgery. Specific instructions will be given to you by our scheduling coordinator. You should get your lab work done PRIOR to your medical clearance appointment so your PCP can review the results during the appointment.

2. You must discontinue the following medication seven (7) days prior to surgery: Aspirin, Aspirin related products, NSAIDS such as Advil, Ibuprofen, Aleve, Feldane, Nuprin, Motrin, Celebrex, Darvon, Ecotrin, Endodan, Excedrin, Florinal, Norgesic, Orphengesic, Percodan, Pravigard, and Soma. These medications may be resumed as soon as possible when deemed safe by your surgeon.

3. YOU MUST discontinue ALL blood thinners such as: Plavix (Clopidogrel), Coumadin (Warfarin), Eliquis, Pradaxa, Brillinta, Fish Oil, Aggrenox, Vitamin K, Vitamin E, Vitamin B6 7 day prior to surgery. These medications may be resumed as soon as possible when deemed safe by your surgeon.

4. FOR WOMEN ONLY: Hold Estrogens (Cenestin, Estratest, Estropipate, Menest, Ortho-Est, Premarin, Premphase, Prempro etc.) on the day of surgery and resume when instructed by your physician.

5. Hold ALL herbal supplements including garlic, ginseng, and St. John's Wart 7 days before surgery.

6. Please discontinue any and all diet pills two (2) weeks prior to your surgical procedure.

7. DO NOT EAT OR DRINK ANYTHING AFTER MIDNIGHT THE DAY BEFORE YOUR SURGERY, AND NOTHING ON THE MORNING OF YOUR SURGERY, UNLESS OTHERWISE ADVISED BY YOUR PHYSICIAN. You may take essential medications, such as blood pressure medications with JUST a sip of water.

8. Please arrive at the surgery center about 1-2 hours prior to your anticipated start time. Typically, the surgery center will provide you with instructions on when to arrive and specific directions (1-2 days beforehand) on when to get there and what to bring. However, it is VERY important that you bring your most recent imaging with you (CT scan/MRI disk).

9. We highly encourage bringing a friend or a family member to the surgery center with you, so that we can explain the post-operative rules and instructions.

10. After your procedure, you will recover in the PACU where nursing staff will provide you with post-operative care and inform you of how the procedure went.

11. If you are prescribed opiate pain medication by another physician (such as pain management physician), MAKE SURE you see them prior to surgery so you are covered for post-surgical pain. Pharmacies will not fill prescriptions from another provider. If you do not take opiates at home, we will prescribe you with a 7-day course to cover your post operative pain.

12. After surgery, you will most likely require physical therapy. This has been proven to lead to optimal outcomes. If you have a preference of a physical therapist, please let your provider know prior to or during your post-operative appointment.

Post Procedure:

1. Refrain from strenuous activities and follow post-operative instructions.

2. Pain can increase in your treatment areas 2-5 days after your procedure. It may take up to 14 days for symptoms to improve. Symptoms may fluctuate during the healing process, which occurs over 4-8 weeks. You likely will not feel fully back to "normal" for about 3 months.

3. You may have some difficulty swallowing and a sore throat for several days after your procedure. This is very common and will typically go away on its own. If it does not go away or you have difficulty with breathing please, call the number provided below.

4. You should apply ice around places of discomfort for 20 minutes on and 20 minutes off. Please place a barrier between your skin and the ice. Heat is okay to apply to your back or neck muscles, just not over the incision site.

5. You may experience a low-grade fever after treatment. Call if your temperature is above 100.4.

6. No anti-inflammatory medication (Celebrex, Advil, Mobic, Motrin, Aleve) should be used for 10 days after surgery.

7. Light exercise or physical therapy is okay to start 2 weeks after treatment.

8. Pain medication prescriptions may say to take 2 tablets every 6 hours. If your instructions say this, JUST TAKE ONE tablet every 4-6 hours as needed for pain. WE DO NOT REFILL NARCOTIC PAIN MEDICATIONS AFTER SURGERY. If you continue to have pain, you will need to see a pain management doctor for narcotics.

9. If you were prescribed a brace, you must wear it when out of bed. If you are sleeping, sitting down, relaxing or eating, you may remove your brace. You will be in your brace between 4-6 weeks, depending on the type of surgery you had. If you had a cervical disc arthroplasty "replacement," you will only require a soft collar for two weeks.

10. Do not drive until you can stomp your feet on the ground and do not feel pain.

11. Wound care: You will have stitches buried underneath your skin. They will dissolve on their own. On top of the wound, you will have skin glue and steri strips (which look like little pieces of white tape). PLEASE INFORM PROVIDER PRIOR IF YOU HAVE ANY ALLERGIES TO SKIN GLUE OR ADHESIVE PRODUCTS. Do NOT remove or peel off steri-strips, these will fall off on their own. On top of the steri-strips, you will have gauze and tape. The gauze and tape is what you will be able to remove in 3 days. Do not wet the dressing at all in those 3 days. On day 3, you may remove the top layer of your dressing in the morning and shower as you normally would. DO NOT SUBMERGE wound in water for 3 weeks (bath tub, jacuzzi, beach, etc.).

12. Besides narcotic medication for pain, you may use Tylenol (acetaminophen) to optimize pain control. You may take up to 3,000 mg per day, unless contraindicated due to allergy or liver issues. Make note that some narcotics are mixed with Tylenol, (for example, Percocet has 325 mg of Tylenol per pill) so dose accordingly.

13. You may walk as long as you are stable. We do want you out of bed as much as possible unless otherwise instructed. NO BENDING, TWISTING, OR LIFTING OVER 10 LBS FOR 4 WEEKS.

14. You will need to follow up in the clinic for a post-operative evaluation in 4 weeks. Depending on your procedure, you may be required to have an X-ray done prior to the appointment. PLEASE BRING THE CD OF YOUR IMAGES. Your X-ray script will be given to you the day of your surgery. If you do not receive it or lose it, please call for a new script.

15. You may have a drain after surgery. Do not be alarmed. The reason we place these drains is because you may have been a little "oozy" after the procedure. We place them so the extra blood and fluid can drain out of your wound easily. They are typically

removed the next day by your home healthcare nurse. If you do not have home healthcare set up, call the office for an appointment to remove the drain. For questions regarding surgical scheduling, please call Chris (Scheduling Coordinator) at 727-605-1770 (EXT 1003). For any post-operative questions or concerns, please call our office at 727-605-1770. Please note that you may be sent to voicemail. We will return your call as soon as possible. If it is an emergency, please call 911. If you are calling after hours, please leave a voicemail in the general inbox and it will be forwarded to the medical team.

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