

TREATMENT OF BRAIN ANEURYSMS WITH COILS AND PIPELINE STENTS INFORMATION FOR PATIENTS AND THEIR FAMILIES

What is a brain aneurysm?

An aneurysm is a small bubble that forms on the wall of an artery, a blood vessel that carries blood to the brain. The aneurysm has a thin wall, compared to the thicker wall of a normal brain artery. This thin walled bubble is prone to rupturing.

What causes brain aneurysms?

An aneurysm is the result of a weakness in the wall of a blood vessel. Most aneurysms occur without any known cause. High blood pressure and smoking are some factors that may cause weakness in the wall of an artery, leading to aneurysms. Some brain aneurysms seem to occur in families, suggesting there may be a genetic cause. Other than controlling high blood pressure and stopping smoking, there is little a patient can do to help stop the growth and formation of aneurysms.

How long has my aneurysm been present?

Unless you have had more than one imaging study of your brain showing the growth of an aneurysm, we cannot tell how long an aneurysm has been present. It may have been there for years, or as short as several months. No one really knows.

What can go wrong with aneurysms?

We are mostly concerned about two things when you have an aneurysm: bleeding and enlargement. An aneurysm can break and cause bleeding in the brain. This bleeding is a type of stroke called 'subarachnoid hemorrhage' (SAH). An aneurysm can also enlarge and cause pressure on either the brain itself or nerves that arise from the brain, and can affect the muscles in the face, eye or neck.

What is the chance my aneurysm will bleed?

The exact risk of bleeding for your aneurysm cannot be known. Very small aneurysms (1-2 mm) seem to have very little risk of bleeding.

What happens if my aneurysm bleeds, and how do I know it has happened?

When an aneurysm bleeds, it usually causes the sudden onset of an extreme headache. Typically, the headache is different from any headache you have ever had, especially in terms of its severity. Often there is nausea and vomiting. If the bleeding is severe, patients often lose consciousness. In about a third of the cases, successful treatment can lead to a complete recovery. In another third of cases, the patient will survive but may go on to suffer a stroke. In the remaining third, the bleed is ultimately fatal.

What is the chance my aneurysm will continue to enlarge, and will that increase the risk of bleeding?

Sometimes we can do tests that show an aneurysm's growth, but often they remain about the same size, sometimes for years. However, even aneurysms that do not grow still have a risk of bleeding. If an aneurysm is growing, the aneurysm will generally continue to enlarge and cause more problems.

What happens if my aneurysm enlarges but does not bleed, and how do I know this has happened?

When an aneurysm enlarges, usually it occurs over a fairly long period of time, weeks or months, sometimes years. The signs and symptoms of an enlarging aneurysm may be slow to develop. If the nerves to your eye are affected, you may notice decreased vision in one eye, occasionally both. Some patients complain of unusual headaches or double vision. Often these headaches occur behind one of their eyes. Typically these headaches are not as severe as when an aneurysm bleeds, but still bothersome. Depending on the location of an aneurysm, weakness in the arms, legs, and hands, or on one side of the body may occur.

Can all aneurysms be treated with coils, and how is that decided?

No, only certain aneurysms can be safely and effectively treated with coils. The location, size, and shape of the aneurysm influence the decision to treat an aneurysm. The decision about how to treat an aneurysm is based on an angiogram. Magnetic resonance imaging (MRI) and magnetic resonance angiography (MRA) can give some idea about how to treat an aneurysm, but those tests are usually not reliable enough to make the final decision.

What if my aneurysm has a wide neck?

Some aneurysms have a wide neck but can still be treated. In this case, physicians treat your aneurysm by placing a stent in the artery. The stent is a scaffold of metal that holds the coils in place inside the aneurysm. The stent is approved for brain aneurysm treatment. If a stent is used, you will need to be pretreated with aspirin and Plavix before the procedure, and then continue both medications for a specific time period as directed.

How do you treat a brain aneurysm with coils?

When we treat an aneurysm with coils, we generally have the patient completely asleep while an anesthesiologist monitors the patient. Patients are placed under general anesthesia because it makes the procedure safer and more comfortable for the patient. After the patient is asleep, a thin, hollow, soft tube called a "catheter" is placed in the artery in the leg. This catheter is approximately 1/8 of an inch wide, but long enough to reach from the leg to the neck. Depending on where the aneurysm is located, the catheter is then guided into the carotid artery in the front of your neck, or the vertebral artery in the back of your neck. Placement of the tube is done by continuously watching the tube move through the body on an x-ray monitor. Once this catheter is placed, a much smaller catheter, called a 'microcatheter' is navigated through the arteries in the neck, and into the artery in the brain where the aneurysm is located. The advanced angiography equipment at SHMC allows us to see the blood vessel, the aneurysm, and the microcatheter continuously from the front and the side. The microcatheter is then gently guided into the aneurysm itself. After the microcatheter is in the aneurysm, soft metal coils made of platinum are gently pushed into the aneurysm. These coils wind and bend because they are very soft, and fill up the aneurysm. Several coils may be placed in the aneurysm to completely fill it. Once we have filled the aneurysm with coils, the

microcatheter is removed from the aneurysm and pulled out of the body. After the catheter is removed from the leg, a suture is generally used to close the hole in the artery in the leg where the catheter was introduced. This suture is under the skin and does not need to be removed.

How does the coil treat the aneurysm, and how quickly is it effective?

Since the coils are a foreign body, once they are placed in the aneurysm, blood begins to clot on the coils. Clotting happens very quickly, within hours, and provides protection against bleeding. Over the next six weeks, the clot changes into scar tissue, this provides further protection from bleeding. There is a risk that clots can form and fall out of the aneurysm into the normal artery, blocking flow. By keeping the coils well inside the aneurysm this risk is low. Occasionally, the scar forms but the aneurysm still enlarges at the neck. In this case, additional treatment may be necessary in the future.

What is a Pipeline Stent and when is it used?

A pipeline stent uses “flow diversion” to treat an aneurysm. It is a stent-shaped device that is placed in the parent artery, across the neck of an aneurysm. This stent diverts the blood flow away from the aneurysm itself. The blood already in the aneurysm then clots and eventually turns to scar tissue. This device can be used in aneurysms with a wide neck, or those where the position or shape is not appropriate for treatment with regular coil embolization. Similar to other stents, Aspirin and Plavix need to be taken after placement of a pipeline stent.

What should my family and friends do when I am undergoing treatment?

There is a waiting room near the angiography procedure room. These procedures typically take two to four hours, occasionally longer. We will give your family updates during the procedure. When the treatment is complete, if you wish, we will discuss the results with your family and friends.

What happens right after the aneurysm is treated?

The anesthesiologist will usually wake you up to the radiology department. You will be watched overnight in the intensive care unit (ICU). That night the nurses will check on you frequently. We would like you to get out of bed that same day if your leg is stable from the arterial puncture. You may eat, but for the first meal you will only have liquids, as some patients are nauseated. It is okay if you do not eat. If you are doing well you may go home the next day. If you have pain you will be given pain medicines, although pain is usually mild. Some headache pain is very common, as is soreness at the groin for several days. Your family and friends can visit you once you have awoken from the anesthesia and are in the ICU.

What about after I am discharged from the hospital?

You can expect to feel very tired for several days after the treatment, mostly as you recover from the general anesthesia. We encourage you to resume normal activities as soon as possible. We would like for you to return to our clinic for follow-up 2-3 weeks after your procedure. You may schedule an appointment sooner if you are having any problems or questions.

What are the risks of treating aneurysms using coils?

We are treating your aneurysm because we think the risks of the aneurysm untreated are higher than the risks of treatment. Still, there are risks of this therapy you need to be aware of and accept before having your aneurysm treated. The major concerns we have treating your aneurysm with coils are:

That we cause bleeding from the aneurysm, or block off normal blood vessels in the brain causing a stroke, or incompletely treating your aneurysm. We do everything possible to prevent these problems, but even in experienced hands these risks are still present. The aneurysm is not a normal artery and blocking it off is usually very safe. Coil treatment of aneurysms is done to prevent bleeding and growth of aneurysms. It appears to be very safe and effective, but in some instances the aneurysm can continue to grow. If this problem occurs the aneurysm may be retreated with coils, or we sometimes recommend surgery in this instance. There are also risks incurred with the angiogram, including allergic reaction, bleeding, stroke and even death. The other handout describing angiography goes into more detail on the risks of this procedure.

What sort of follow-up do I need for my aneurysm after it is treated with coils?

We generally recommend that you have a follow-up angiogram **six months** after treatment of your aneurysm, to ensure it is not continuing to grow. This recommendation is often altered depending on your age, medical history, or individual circumstances. Additional follow up angiograms would be done **at 1,2 and 5 years**

How long have aneurysms been treated with coils?

The treatment of aneurysms using coils was first described around 1990. Before that time small balloons were placed in aneurysms and then inflated, leading to closure of the aneurysm. This technology was very commonly used in the Soviet Union, where surgery for aneurysms was not particularly successful. That technology has been replaced by the currently available coils.

What are the coils and stents made from and what does that mean?

The coils we use for aneurysms are made from platinum. Platinum never breaks down in the body and will remain forever. It is safe to have MRIs if the coils are used, as they do not affect that test. You can also have CT scans, but the coils will cause artifacts on a brain scan. There have been no negative reactions to platinum coils; they do not cause allergic reactions. The stent is made of a metal that is similar to platinum in its stability.

Do I have other options for treatment of my aneurysm other than coils?

Currently aneurysms are treated by either surgery, which involves a brain operation to place a clip on the aneurysm from outside the blood vessel, or by coiling. Some aneurysms are better managed by surgery, others by coiling. Some aneurysms are difficult to treat by either method and in that case no treatment, other than observation, may be the best option. We will discuss these options with you, the ultimate decision on how to treat an aneurysm lies with, you, the patient and/or your family.

What if I have more than one aneurysm?

About 10 percent of patients have more than one aneurysm. These other aneurysms can sometimes be treated with coils, surgery, or sometimes we just recommend following these other aneurysms by MRI or MRA, especially if they are small.

Is there ongoing research on new treatments for aneurysms?



Yes, there are many medical device companies working on new therapies for aneurysms. Some of these therapies utilize stents, glues, and new types of coils.