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For patients

Catheter Embolization



Catheter embolization places medications or synthetic materials called embolic agents through a catheter into a blood vessel to block blood flow to an area of the body. It may be used to control or prevent abnormal bleeding, close off vessels supplying blood to a tumor, eliminate abnormal connections between arteries and veins, or to treat aneurysms. Embolization is a highly effective way to control bleeding and is much less invasive than open surgery.

Your doctor will instruct you on how to prepare, including any changes to your medication schedule. Tell your doctor if there's a possibility you are pregnant and discuss any recent illnesses, medical conditions, allergies and medications you're taking, including herbal supplements and aspirin. You may be advised to stop taking aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs) or blood thinners several days prior to your procedure. You also may be told not to eat or drink anything after midnight before your procedure. Plan to stay at the hospital overnight. Leave jewelry at home and wear loose, comfortable clothing. You will be asked to wear a gown.

What is Catheter Embolization?

Embolization is a minimally invasive treatment that blocks one or more blood vessels or abnormal vascular channels.

In a catheter embolization procedure, medications or synthetic materials called embolic agents (http://www.radiologyinfo.org) are placed through a catheter into a blood vessel to prevent blood flow to the area.

What are some common uses of the procedure?

Catheter embolization can be applied to almost any part of the body to control or prevent abnormal bleeding. Common health problems that can be treated using catheter embolization include:

- Bleeding that results from a traumatic injury. Controlling bleeding into the abdomen or pelvis from injuries caused by a motor vehicle accident is especially suitable for this treatment.
- Bleeding from gastrointestinal tract lesions (http://www.radiologyinfo.org) such as ulcer or diverticular disease. Embolization is commonly the first line of treatment in gastrointestinal bleeding of any cause.
- Bleeding from vascular malformations. For example, abnormal vascular channels can form in between arteries and veins in the circulatory system of the lungs. Catheter embolization can be used to eliminate these abnormal connections.
- Tumor bleeding. Embolization can help reduce the pain associated with tumor bleeding.
- Long menstrual periods or heavy menstrual bleeding that results from uterine fibroid tumors (http://www.radiologyinfo.org) . Embolization may prove to be an excellent alternative to hysterectomy, the surgical removal of the uterus. Because fibroids have a large blood supply, embolization can shrink and control heavy menstrual bleeding by interrupting the blood supply. *See the Uterine Fibroid Treatment page (https://www.radiologyinfo.org/en/info/uterine-fibroid-treatment) for more information.*

Catheter embolization is also performed to:

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- Close off vessels that are supplying blood to a tumor, especially when the tumor is difficult or impossible to remove. Embolization may also be used to administer chemotherapy. After embolization a tumor may shrink or it may continue to grow but more slowly, making chemotherapy (http://www.radiologyinfo.org) or surgery a more effective option.
- Eliminate an arteriovenous malformation (http://www.radiologyinfo.org) or arteriovenous fistula (http://www.radiologyinfo.org) (AVF) (abnormal connection or connections between arteries and veins). These passageways, which may occur anywhere in the body including the brain or spinal cord, act like a short circuit to prevent blood from fully circulating and delivering oxygen where it is needed.
- Treat aneurysms (a bulge or sac formed in a weak artery wall) by either blocking an artery supplying the aneurysm or closing the aneurysmal sac itself as an alternative to surgery.
- Treat varicoceles (enlarged veins) in the scrotum that may be a cause of infertility. *See the Varicocele Embolization page (https://www.radiologyinfo.org/en/info/varicocele) for more information.*
- Decrease the size of congenital venous malformations (a tangle of veins that did not develop into a normal straight vein) in order to decrease pain, swelling and clot formation.

Catheter embolization may be used alone or combined with other treatments such as surgery or radiation (http://www.radiologyinfo.org) .

How should I prepare?

Prior to your procedure, your doctor may test your blood to check your kidney function and to determine if your blood clots normally.

Tell your doctor about all the medications you take, including herbal supplements. List any allergies, especially to local anesthetic (http://www.radiologyinfo.org) , general anesthesia (http://www.radiologyinfo.org) , or contrast materials (http://www.radiologyinfo.org) . Your doctor may tell you to stop taking aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs (http://www.radiologyinfo.org)) or blood thinners before your procedure.

Tell your doctor about recent illnesses or other medical conditions.

Women should always tell their doctor and technologist (http://www.radiologyinfo.org) if they are pregnant. Doctors will not perform many tests during pregnancy to avoid exposing the fetus (http://www.radiologyinfo.org) to radiation. If an x-ray is necessary, the doctor will take precautions to minimize radiation exposure to the baby. *See the Radiation Safety (https://www.radiologyinfo.org/en/info/safety-radiation) page for more information about pregnancy and x-rays.*

You will receive specific instructions on how to prepare, including any changes you need to make to your regular medication schedule.

Your doctor will likely tell you not to eat or drink anything after midnight before your procedure. Your doctor will tell you which medications you may take in the morning.

You will be admitted to the hospital on the morning of your procedure. The interventional radiologist (http://www.radiologyinfo.org) will assess you before the procedure begins.

You should plan to stay overnight at the hospital for one or more days.

What does the equipment look like?

In this procedure, x-ray (http://www.radiologyinfo.org) equipment, a catheter (http://www.radiologyinfo.org) and a variety of synthetic materials and medications called embolic agents are used.

This exam typically uses a radiographic table, one or two x-ray tubes, and a video monitor. Fluoroscopy converts x-rays into video

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images. Doctors use it to watch and guide procedures. The x-ray machine and a detector suspended over the exam table produce the video.

A catheter is a long, thin plastic tube that is considerably smaller than a "pencil lead." It is about 1/8 inch in diameter.

Your physician will select an embolic agent depending on the size of the blood vessel or malformation and whether the treatment is intended to be permanent or temporary. These include:

- Gelfoam™, a gelatin sponge material, which is cut into small pieces that are injected into an artery and float downstream until they can go no further. After a period ranging from a few days to two weeks, the material dissolves.
- Particulate agents (http://www.radiologyinfo.org) , including Polyvinyl alcohol (PVA) and gelatin-impregnated acrylic polymer spheres, which are suspended in liquid and injected into the bloodstream to block small vessels. These agents are used to block blood vessels permanently.
- Various sized metallic coils or other mechanical devices made of stainless steel or platinum are used to block large arteries. They can be positioned very precisely to stop bleeding from an injured artery or stop arterial blood flow into an aneurysm (http://www.radiologyinfo.org) .
- Liquid sclerosing (http://www.radiologyinfo.org) agents such as alcohols, which are used to destroy blood vessels and vessel malformations. Filling a blood vessel or vascular abnormality with this liquid agent causes blood clots to form, closing up the abnormal vascular channels.
- Liquid glue. When injected into the target channel that needs to be closed off, it hardens quickly.
- Select chemotherapy medications, such as doxorubicin or irinotecan, may be used in the embolization treatment of tumors.

This procedure may use other equipment, including an intravenous (http://www.radiologyinfo.org) line (IV), ultrasound machine and devices that monitor your heart beat and blood pressure.

How does the procedure work?

Using x-ray imaging and a contrast material (http://www.radiologyinfo.org) to visualize the blood vessel, the interventional radiologist inserts a catheter through the skin into a blood vessel and advances it to the treatment site. A synthetic material or medication called an embolic agent is then inserted through the catheter and positioned within the blood vessel or malformation where it will remain permanently.

How is the procedure performed?

Image-guided, minimally invasive procedures such as catheter embolizations should be performed by a specially trained interventional radiologist (http://www.radiologyinfo.org) in an interventional radiology (http://www.radiologyinfo.org) suite or occasionally in the operating room.

Prior to your procedure, your doctor may perform ultrasound (http://www.radiologyinfo.org) , computed tomography (CT), or magnetic resonance imaging (http://www.radiologyinfo.org) (MRI) exams.

Catheter embolization uses ultrasound, CT or MRI to obtain images of your blood vessels to assess your condition.

You will lie on the procedure table.

The doctor or nurse may connect you to monitors that track your heart rate, blood pressure, oxygen level, and pulse.

A nurse or technologist (http://www.radiologyinfo.org) will insert an intravenous (http://www.radiologyinfo.org) (IV) line into a vein in your hand or arm to administer a sedative. This procedure may use moderate sedation. It does not require a breathing tube. However, some patients may require general anesthesia (http://www.radiologyinfo.org) .

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The nurse will sterilize the area of your body where the catheter is to be inserted. They will sterilize and cover this area with a surgical drape.

The doctor will make a very small skin incision at the site.

Using image-guidance, the doctor inserts a catheter (http://www.radiologyinfo.org) through the skin to the treatment site.

A contrast material is injected through the catheter and a series of x-rays are taken to locate the exact site of bleeding or abnormality. The medication or embolic agent is then injected through the catheter. Additional x-rays are taken to ensure the procedure was a success and that there is loss of blood flow in the target blood vessel or abnormality.

When the procedure is complete, the doctor will remove the catheter and apply pressure to stop any bleeding. Sometimes, your doctor may use a closure device to seal the small hole in the artery. This will allow you to move around more quickly. No stitches are visible on the skin. The nurse will cover this tiny opening in the skin with a dressing.

The doctor or nurse will remove your IV line before you go home.

If you are being treated for an intracranial arteriovenous malformation (AVM), a small test injection of embolic agent is done first and neurological function will be tested to ensure no important brain area will be affected by the embolization. Then, vessels feeding the AVM will be injected with the embolic material. Large AVMs may require multiple embolization procedures on separate days for complete treatment. For example, two or three treatments may be given at intervals of two to six weeks. *See the Brain Embolizations (https://www.radiologyinfo.org/en/info/dc-embol) page for more information.*

You can expect to stay in bed for six to eight hours after your procedure.

The length of the procedure varies from 30 minutes to several hours depending on the complexity of the condition.

What will I experience during and after the procedure?

The doctor or nurse will attach devices to your body to monitor your heart rate and blood pressure.

You will feel a slight pinch when the nurse inserts the needle into your vein for the IV line and when they inject the local anesthetic. Most of the sensation is at the skin incision site. The doctor will numb this area using local anesthetic. You may feel pressure when the doctor inserts the catheter into the vein or artery. However, you will not feel serious discomfort.

If the procedure uses sedation, you will feel relaxed, sleepy, and comfortable. You may or may not remain awake, depending on how deeply you are sedated.

You may feel slight pressure when the doctor inserts the catheter (http://www.radiologyinfo.org) , but no serious discomfort.

At some point during the procedure, contrast material will be injected into the blood vessel.

As the contrast material (http://www.radiologyinfo.org) passes through your body, you may feel warm. This will quickly pass.

Most patients experience some side effects after embolization (http://www.radiologyinfo.org) . Pain is the most common and can be controlled by medication given by mouth or through your IV.

Women who have embolization of fibroid tumors may have severe pain or cramps shortly after the procedure and for eight to 12 hours afterward. Pain for as long as three to five days after the procedure is not uncommon and may require appropriate pain medication. *See the Uterine Fibroid Treatment page (https://www.radiologyinfo.org/en/info/uterine-fibroid-treatment) for more information.*

Mild headache may follow embolization of an intracranial arteriovenous malformation (AVM).

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Most patients leave the hospital within 24 hours of the procedure, but those who have considerable pain may have to stay longer.

You should be able to resume your normal activities within a week. Until then, minimal activity is recommended.

About one in five patients treated for fibroids will develop post-embolization syndrome (http://www.radiologyinfo.org) , which consists of fever (up to 102° F) that may be accompanied by loss of appetite and nausea or vomiting. The syndrome may occur after any embolization procedure, but is more prone to develop when a solid tumor is embolized. The symptoms usually clear up within three days, though they sometimes last longer and require medication to improve. These symptoms are the body's reaction to breakdown products from the tumors and are most common when very large tumors are embolized.

Who interprets the results and how do I get them?

After the procedure is complete, the interventional radiologist (http://www.radiologyinfo.org) will tell you whether the procedure was a success.

In cases of bleeding, it may take 24 hours to know whether it has stopped. After embolization of a tumor, uterine fibroids or a vascular abnormality, one to three months may have to pass before it is clear whether symptoms have been controlled or eliminated.

Your interventional radiologist may recommend a follow-up visit.

This visit may include a physical check-up, imaging exam(s), and blood tests. During your follow-up visit, tell your doctor if you have noticed any side effects or changes.

What are the benefits vs. risks?

Benefits

- Embolization is a highly effective way of controlling bleeding, especially in an emergency situation.
- Worldwide success rates of 85 percent and higher have been reported in women treated with embolization for uterine fibroids.
- Embolization is much less invasive than conventional open surgery. As a result, there are fewer complications and the hospital stay is relatively brief—often only the night after the procedure. Blood loss is less than with traditional surgical treatment, and there is no obvious surgical incision.
- This method can be used to treat tumors and vascular malformations that either cannot be removed surgically or would involve great risk if surgery was attempted.
- No surgical incision is necessary—only a small nick in the skin that does not need stitches.

Risks

- There is a very slight risk of an allergic reaction if the procedure uses an injection of contrast material (http://www.radiologyinfo.org) .
- Any procedure that places a catheter inside a blood vessel carries certain risks. These risks include damage to the blood vessel, bruising or bleeding at the puncture site, and infection. The doctor will take precautions to mitigate these risks.
- There is always a chance that an embolic agent (http://www.radiologyinfo.org) can lodge in the wrong place and deprive normal tissue of its oxygen supply.
- There is a risk of infection after embolization, even if an antibiotic has been given. However, the physician takes ample care to minimize this risk.
- A small percent of women have uterine injury from embolization of fibroid tumors — *see the Uterine Fibroid Treatment page (https://www.radiologyinfo.org/en/info/uterine-fibroid-treatment)* — and this may make it necessary to remove the uterus (hysterectomy). In a few cases in women over age 45, menopause has begun within one year of embolization of

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fibroids. The effect of fibroid embolization on fertility is not clearly understood; women who wish to have children in the future should consult carefully with their interventional radiologist prior to pursuing fibroid embolization as a treatment option.

- Because contrast material is used in the procedure, there is a risk of an allergic reaction to the contrast material. However, patients are prescreened for this risk.
- There is also a risk of kidney damage due to the contrast material, particularly in patients with diabetes or other pre-existing kidney disease. However, patients are prescreened for this risk.

What are the limitations of Catheter Embolization?

Technically, successful embolization requires the catheter be placed in a precise position to prevent injuring normal tissue. This means that the catheter tip is placed so that embolic material is deposited only in blood vessels that serve the abnormal area. In a small percentage of cases, the procedure is not technically possible because the catheter cannot be positioned appropriately. Whether clinical success is achieved depends on many factors, including the size of a tumor, the location of an arteriovenous malformation (AVM), and how the patient views the outcome. Several sessions of embolization may be needed to reduce symptoms from an AVM. Uterine fibroids respond well in a large majority of cases, but perhaps 10 percent of women fail to improve. *See the Uterine Fibroid Treatment page (https://www.radiologyinfo.org/en/info/uterine-fibroid-treatment)* .

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