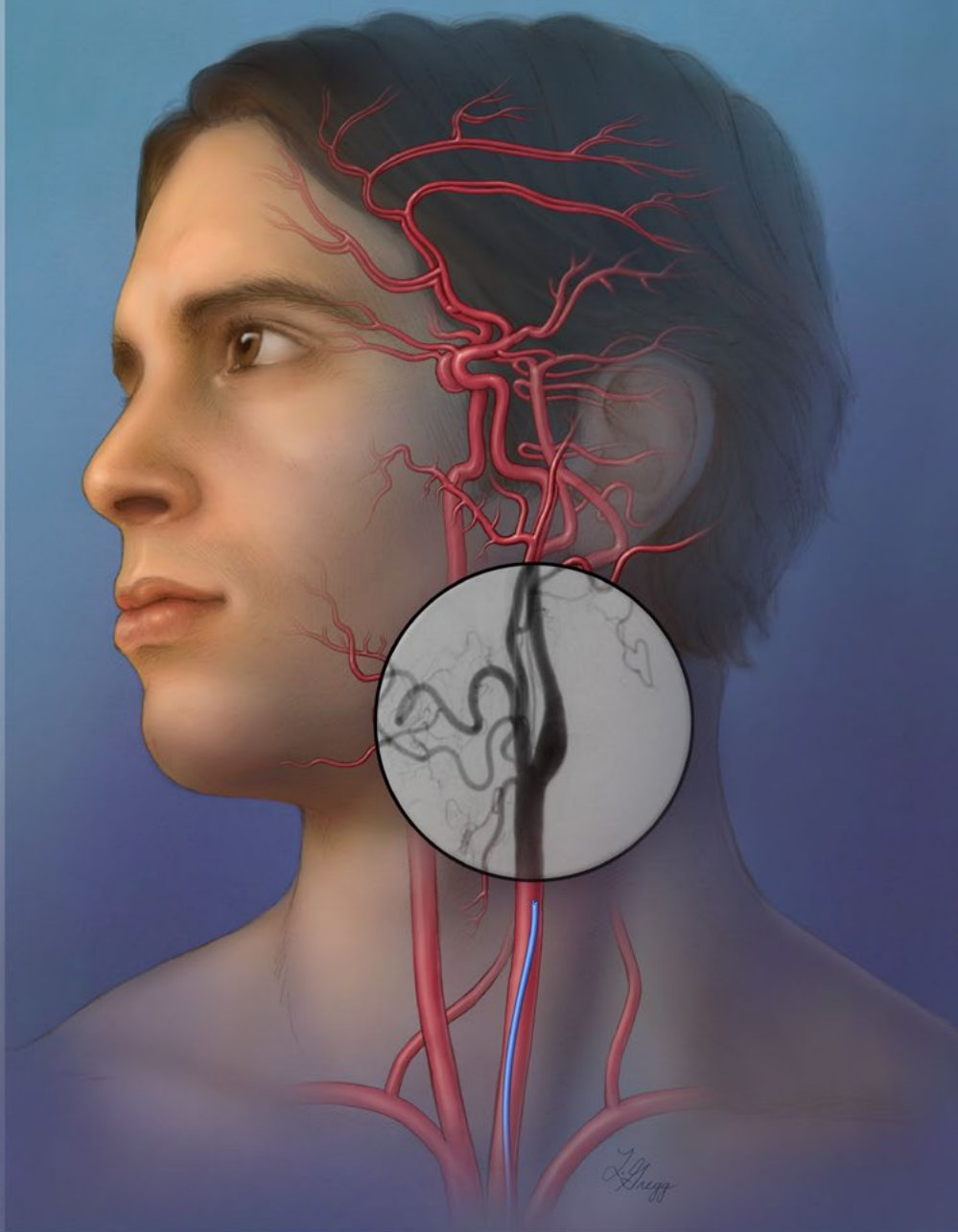


Cerebral Angiography



JOHNS HOPKINS
MEDICINE

Division of Interventional
Neuroradiology

Diagnostic Cerebral Angiography

Dear patient and family,

Welcome to Johns Hopkins Medicine! Your doctor has referred you to the Johns Hopkins Division of Interventional Neuroradiology so that we may examine or treat the blood vessels supplying your head and neck. During your stay, you will be under the care of a dedicated team of experienced healthcare professionals.

Our goal is to make you as comfortable as possible during your visit to the Johns Hopkins Hospital. We hope that you will find this pamphlet useful and informative. Please read it carefully and share with us your questions and suggestions.

Sincerely,

Dr. Philippe Gailloud, Director
Division of Interventional Neuroradiology
The Johns Hopkins Hospital
Email: INR@jhmi.edu

Disclaimer: This booklet is intended to provide general information and is not intended to be a substitute for professional medical advice. The reader should consult his or her health-care provider to determine how this information relates to his or her own medical condition or treatment plan. Reading this brochure does not create a new physician-patient relationship between the reader and any health care provider.

What is a diagnostic cerebral angiogram?

A diagnostic cerebral angiogram is a medical procedure that offers an extremely precise evaluation of your blood vessels. Cerebral angiography helps to diagnose medical conditions that involve the arteries and veins in the head and neck, including the brain. During a cerebral angiogram, highly specialized doctors (called neuro-angiographers) are able to observe the blood vessels by using modern sophisticated imaging equipment. In order to take pictures of the blood vessels, a contrast medium, or “dye,” is injected into the targeted vessel through a small, soft, and flexible tube called a catheter. This catheter is inserted in the groin and carefully advanced towards the targeted blood vessel under the guidance of low dose x-rays (Figure 1).

Images of the blood vessels are then obtained by injecting the contrast medium through the catheter into the blood vessel, and by taking x-ray pictures as the contrast agent travels through the arteries and veins.

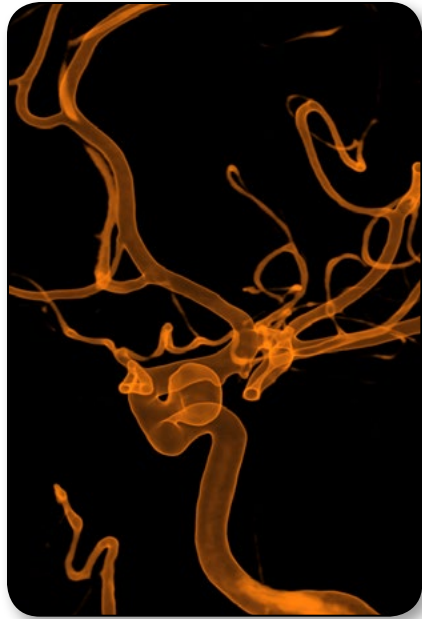


Figure 1. A cerebral angiogram of one side of the brain's blood vessels

What conditions can be diagnosed with a cerebral angiogram?

Conditions commonly diagnosed by cerebral angiography include cerebral aneurysms, vascular malformations, vascular tumors, strokes and stroke-related syndromes.

How should I prepare?

An appointment may be set up with one of our providers a few days before the date of your cerebral angiogram. During this appointment,

a physical exam will be performed and laboratory work or tests that are needed before the procedure will be ordered. The provider will also review the consent form with you, and answer any questions you may have about the procedure. If you are coming from out of town, you will speak with one of our providers on the phone to arrange your pre-procedure testing.

If you are scheduled to have your procedure under general anesthesia or deep sedation because of an associated medical condition (such as COPD, uncontrolled asthma, sleep apnea, heart failure, or a neuromuscular disease), a member of the Johns Hopkins Anesthesiology Department will meet with you within a 2-week period before your procedure date. During this appointment, a physical exam will be obtained and additional laboratory tests may be ordered.

You should continue to take all your prescribed medications as directed, unless told otherwise by your physician. **Please notify us as soon as possible if:**

- You are allergic to iodine-based contrast (used for CT or x-ray exams)
- You have a lung or kidney disease
- You have sleep apnea that requires you to wear a mask to sleep
- You take insulin or metformin (Glucophage) for diabetes or a blood thinner such as aspirin or warfarin (Coumadin)
- You are pregnant or think you may be pregnant

What should I bring with me the day of my procedure?

- X-ray, CT, or MRI films related to your condition
- A portable DVD player or music device with earphones and CDs with music. Television is available in the recovery area
- Someone to drive you home after the procedure. **Failure to have an escort home will result in cancellation of your procedure**

Can I eat before my procedure?

If your procedure is being performed under **sedation**:

You should not have any solid foods or milk products for 8 hours before you arrive for your procedure. You may have clear liquids until 2 hours before you arrive for your procedure.

You should have **NOTHING** during the last two hours before you arrive for the procedure. **Failure to follow to these guidelines may result in cancellation of your procedure.**

Diet	Examples
Solid food	Any food, milk products, cream, gum, mints, cough drops
Clear liquids	Water, apple juice, lemon-lime soda, ginger ale, plain jello, tea, black coffee (WITHOUT MILK)

If your procedure is being performed under **general anesthesia**:

You should have nothing to eat or drink after midnight on the day

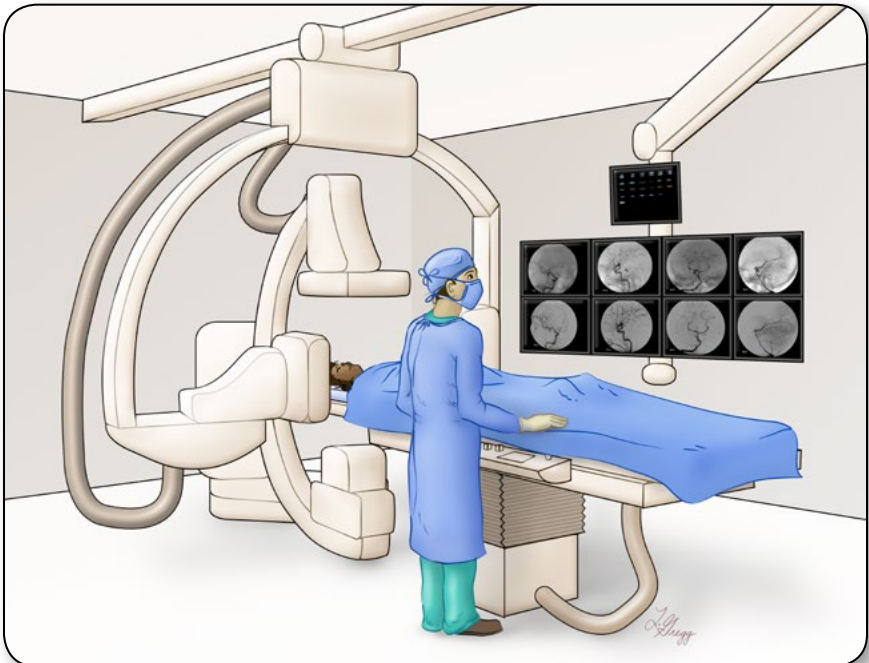


Figure 2. Neuroangiography suite and equipment

before your procedure. Please discuss your medications with the anesthesia team when you meet with them before your procedure.

How is a cerebral angiogram performed?

The procedure is performed in a room specifically designed for angiography of the nervous system, the neuro-angiography suite (Figure 2). This room is equipped with machines that use x-rays to create images of blood vessels as the contrast is given through the catheter into the neck and brain. The pictures are recorded and displayed on screens that the doctors watch as they are performing the procedure. The doctor will look at the pictures more closely once your procedure is finished.

Most neuro-angiography procedures are performed under sedation. Once in the angiography suite, your nurse will give you a combination of medications that will help you relax and remove uncomfortable sensations during the procedure. You will not be fully asleep and therefore you will be able to talk with your doctors and nurses during the procedure. It is particularly important to let them know if you experience any type of discomfort, so they can adjust the amount of medication you are receiving. In addition to the sedation medications, the doctor will also apply numbing medicine to your groin in order to ease any local discomfort.

The catheter will then be inserted into an artery in the leg (femoral artery) through a small skin incision. You may feel some pressure in the groin area as the catheter is placed in the artery. Accessing the femoral artery gives the doctor a direct pathway to the vessels of the head and the neck without crossing or coming close to the heart (Figure 3). When the catheter is in the correct position, the contrast will be injected into the blood vessels. The contrast usually produces a warm, but not painful, feeling in the face that lasts for a few seconds. During this time, x-ray pictures of the blood vessels are taken. It is important to remain still while the contrast travels through the blood vessels so that the pictures taken are of good quality; therefore, you will be asked to hold your breath for a short period of time (around 10 seconds) during each contrast injection.

If your procedure is scheduled under general anesthesia, the steps mentioned above are performed once you are asleep.

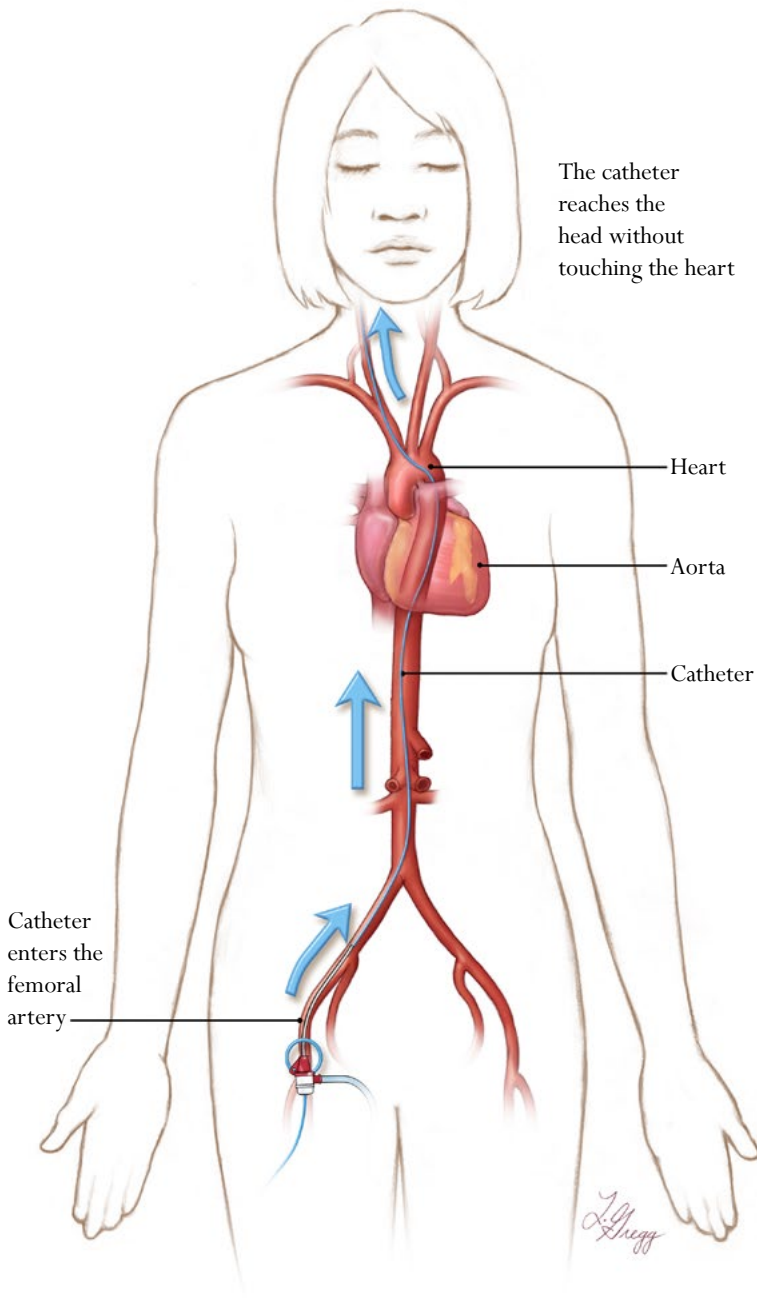


Figure 3. Here we see the path traveled by the catheter from the groin area to the head and neck where the contrast is injected

What happens after the procedure?

At the end of the procedure, the catheter is removed from the groin. The doctor holds pressure at that site for 15 to 20 minutes, and a band-aid is applied.

You will stay in the recovery room for 5 to 6 hours after the procedure. Because moving or bending the leg can cause a complication, such as a groin hematoma, you will need to remain completely flat for the first two hours of recovery. After the first two hours, the head of the bed will be gradually lifted. Once you are awake in the recovery room, you may have something to eat and/or drink, and your family can come visit you. We request that no more than two family members be present at the same time due to space limitation.

In selected situations, a closure device (“vascular plug”) can be used to seal the site where the catheter was placed instead of applying pressure to the groin at the end of the procedure. When a seal device is used, the recovery period is reduced to three hours, but these devices cannot be used in every case, and they carry a slight risk of infection. This will be discussed with you before the procedure.

You will be discharged with written instructions after the procedure, provided no complication occurs. One of the neuro-angiography nurses will review the discharge information with you before you leave and answer any questions you may have. Most patients can typically return to work a day or two after the procedure and travel by plane a day after the procedure. Please be sure to take back any x-ray or other radiology films you may have brought with you.

What kind of complications can occur?

Diagnostic cerebral angiography is very safe when performed by a dedicated and experienced team such as ours. However, complications can happen during a cerebral angiogram, which include allergic reactions to the contrast agent, kidney impairment, damage or blockage to a blood vessel potentially causing a stroke, and bleeding at the site where the catheter was placed (the groin). Our team will discuss these risks with you in detail before your procedure.

Glossary of terms used:

Aneurysm: focal weakening of the wall of an artery causing it to stretch, balloon, or bulge

Angiogram: a radiologic test that uses x-rays to visualize the blood vessels in the body

Artery: a blood vessel that carries high-pressure, oxygenated blood from the heart to the organs of the body (at the exception of the pulmonary arteries that carry non-oxygenated blood back to the lungs)

Catheter: a thin, flexible tube that is used to navigate and deliver contrast into the blood vessels

Cerebral: involving the brain

Contrast (“x-ray dye”): an iodine-based substance that is injected into the blood vessels to make them visible to x-rays

Groin: the bend of the leg between the top of the thigh and the trunk

Hematoma: a blood clot resulting from a vessel leaking

Neuroangiography: a diagnostic test used to examine the blood vessels of the brain, neck, spine, or spinal cord

Stroke: brain damage due to the blockage of a blood vessel in the head or neck

Stenosis: narrowing of a blood vessel

Vascular malformation: an abnormal group of blood vessels

Vein: a blood vessel that carries low-pressure, non-oxygenated blood from the organs of the body to the heart (at the exception of the pulmonary veins that carry oxygenated blood from the lungs to the heart)

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