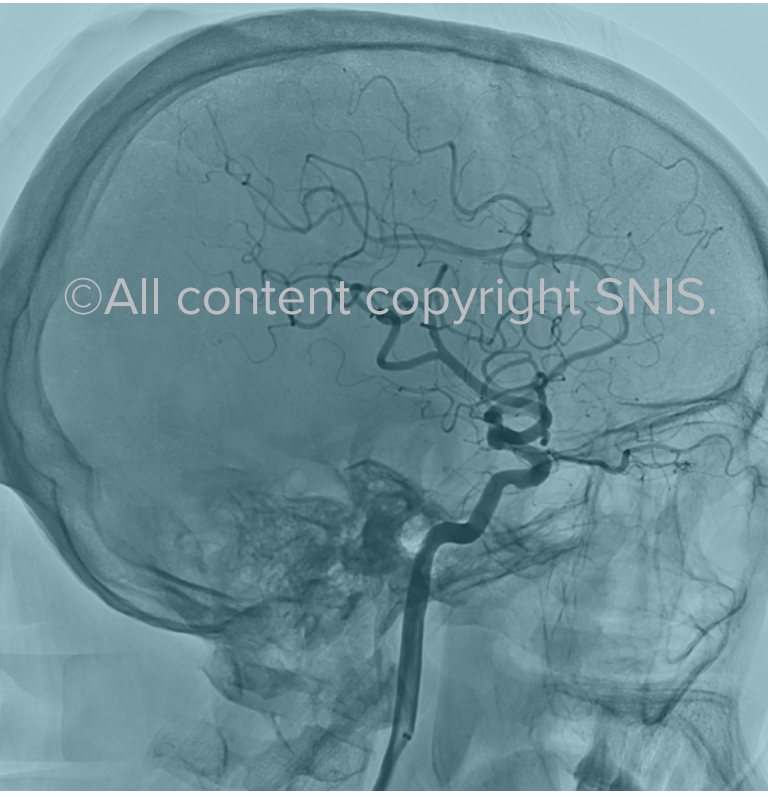
Cerebral Angiography

What is a Cerebral Angiogram?



SNIS Society of NeuroInterventional Surgery

Right Internal Carotid Artery Angiogram

What is a cerebral angiogram?

A cerebral angiogram is an x-ray examination of the blood vessels (arteries and veins) of the brain performed by a physician with training in brain imaging. During an angiogram, you are generally awake but sedated, having received IV medications to help relax. A nurse trained in conscious sedation monitors you during the procedure.

A cerebral angiogram is considered a minimally invasive procedure, which carries some risks. Your physician will explain the risks and benefits of the exam, before you sign the informed consent and undergo the procedure.

Once you arrive to the angiography suite, a nurse will clean the local area of the skin at the puncture site with an antiseptic solution and cover it with a sterile drape. The procedure is accomplished by inserting a thin tube or catheter in the femoral artery (in the groin crease) or radial artery (in the wrist) (Figure 1) through a small nick in the skin. Occasionally, an ultrasound (US) probe is used to locate the site of the puncture. Local anesthesia combined with IV sedation makes this procedure very

safe, and the procedure is generally performed with minimal discomfort at the beginning of the angiogram.

Then, under X-ray guidance, the physician directs the catheter to where the arteries leading up to the brain take off. When the angiogram is done for a diagnostic purpose, the catheter typically does not need to go into the head. Once in position in the neck, the catheter is used to deliver X-ray dye (contrast), which enables blood tagged with contrast to clearly show the cerebral blood vessels.

Once the angiogram is complete, the catheter is removed. To prevent the artery from bleeding, pressure is applied to the catheter insertion site for approximately 10-15 minutes, and a device may be used to make sure the artery is completely closed. The angiogram often lasts less than 1 hour. However, upon its completion, the procedure may require you to undergo several hours of bed rest upon returning back to the room if the access site is through the femoral artery. You will also be monitored for several hours after the procedure as you recover from sedation medications. No bed rest is necessary if the access site is through the radial artery.

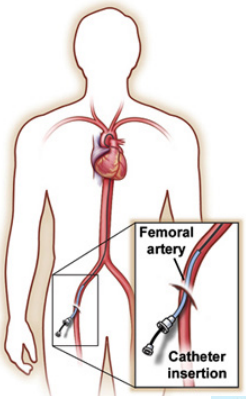
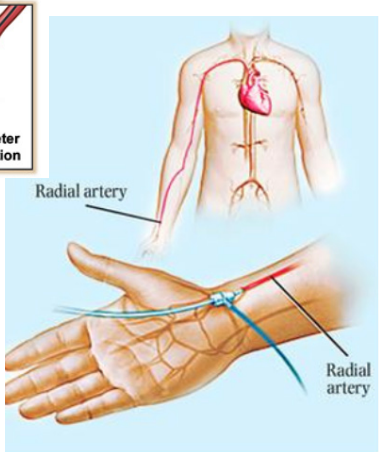


Figure 1. Schematic diagram showing the path from the femoral artery and radial artery to the carotid arteries



Why an angiogram?

Cerebral angiography is the most definitive way to view the blood vessels of the brain. In addition to providing high-resolution images, an angiogram also provides information about brain blood flow with each heartbeat.

Brain aneurysms (weak, bulging spot on an artery), vascular malformations (abnormal tangles of blood vessels) and vessel blockages are among the conditions that can be accurately detected using an angiogram (Figure 2a, b, c). This procedure, depending upon what it reveals, can also facilitate treatment decisions. Occasionally, the cerebral angiogram is performed to better define your anatomy prior to brain surgery.

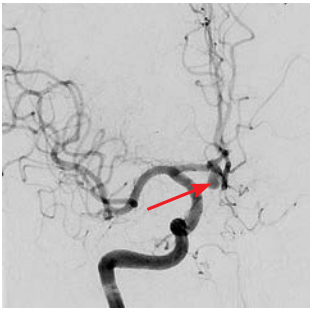


Figure 2a. Anterior-posterior view

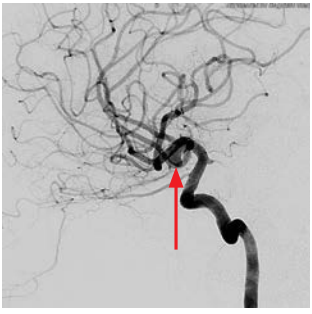


Figure 2b. Lateral view of a cerebral angiogram, right internal carotid artery injection, demonstrating an anterior communicating artery aneurysm (arrow)

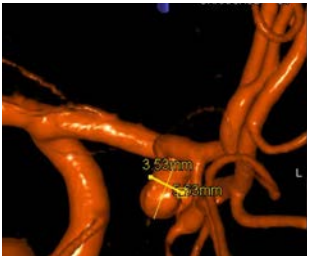


Figure 2c. 3D rotational view from the same angiogram detailing the aneurysm and its measurements

What are the benefits and risks of an angiogram?

Benefits

A cerebral angiogram offers the most detailed depiction of the brain's blood vessels. Computed Tomography (CT), Magnetic Resonance Imaging (MRI) and ultrasound are often useful in studying blood vessels. Sometimes, the level of detail available only through catheter cerebral arteriography is necessary for your doctor to conduct an accurate and precise evaluation to help establish the correct diagnosis and assist with treatment planning. A different specialist such as a neurologist, neurosurgeon or radiologist may refer you for this procedure. In certain emergencies, the catheter angiogram combines diagnosis and treatment into a single procedure.

Risks

All medical procedures carry some risks. The most serious risk of a cerebral angiogram is stroke. Stroke can result from blood clots that dislodge from blood vessel plaques or from the catheter. Catheter-induced tears in the lining of blood vessels (called "dissections") can also cause a stroke. In both of these situations, blood flow is restricted depriving brain cells of the vital oxygen they need to survive. Overall, the risk of stroke during diagnostic angiography at high-volume centers is less than 1 percent. Stroke, although uncommon, can result in permanent deficits including inability to move, inability to speak, or vision loss.

More common, but less severe, complications include bleeding, bruising or infection at the blood vessel puncture site and reactions to x-ray dye or medications used for sedation. There is also some exposure to radiation, usually not significant for a cerebral angiogram performed for diagnostic purposes.

All efforts are made to ensure these risks are minimized during a cerebral angiogram. Some risks may be patient-specific and would be discussed prior to per-

forming the procedure. The physician that performs your angiogram usually obtains the informed consent prior to the exam and he/she is able to answer all the questions you may have.

How do you prepare for an angiogram?

Prior to having an angiogram, your doctor needs to know if you:

- Are pregnant or breast feeding
- Have any allergies, especially to iodine dye
- Have bleeding problems or are on any blood thinners
- Have diabetes, especially if you take Metformin
- Have any kidney disease

Make sure that your doctor has a complete list of all the medications that you are taking. Some medications, including blood thinners and those for blood pressure, blood sugar and weight loss, may affect how you prepare for the angiogram.

You will be asked not to eat or drink for several hours prior to the angiogram, typically starting from the night before the procedure. You may also be asked to not take specific medications. Blood tests may be performed prior to the procedure.

What is the recovery time after an angiogram?

Since angiograms are usually performed under sedation, you will be asked not to drive or operate machinery or power tools, ride a bicycle or drink any alcoholic beverages until the medicines completely disappear from your system the next day. After the procedure, you might feel a little sleepy or tired, but this feeling will slowly wear off.

It is also important not to perform any heavy lifting for about a week after the procedure to allow the blood vessel puncture site in the leg or arm to heal. Showers are permitted the next day after the procedure, usually

24 hours later; however, you should not submerge the site under water (i.e. no baths or swimming) until the skin nick is completely healed.

Care of the catheter insertion site

If you have strips of tape on the incision the doctor made, leave the tape on for the rest of the day. Watch for bleeding from the incision. A small amount of blood (up to the size of a quarter) on the bandage can be normal. You may have some bruising around the incision in your groin or wrist/forearm but you should not have much pain. Keep the catheter insertion site clean and dry.

If any active bleeding from the site of the puncture occurs when you are back home, it is important not to panic. Ask someone to apply pressure with the fingers and compress to avoid blood loss, and keep the pressure for 15 minutes. If the bleeding does not stop after 15 minutes, maintain pressure and call 911.

Restarting diet and medications

Your doctor will tell you if and when you can restart your medications. Normally, most medications can be restarted shortly after the procedure once you arrive home. However, your doctor may give you special instructions about when it is safe to resume specific medications again, such as blood thinners. Since contrast can affect elimination of Metformin, it is typically held before the procedure, and for 48 hours after. Consult with your doctor about what you should do.

Be safe with your medications. Take pain medicines exactly as directed. Normally, over the counter pain medications can be used to control discomfort at the puncture site. Stronger pain medications are usually not needed after cerebral angiography.

You can eat your normal diet. Drink enough fluids to keep your urine clear or pale yellow.

Finally, do not forget to keep all follow-up appointments as directed by your physician.

Founded in 1992 as the American Society of Interventional and Therapeutic Neuroradiology (ASITN), the Society of NeuroInterventional Surgery (SNIS) is a scientific and educational association with over 1,500 members worldwide. The SNIS is dedicated to advancing the specialty of neurointerventional surgery in order to provide the highest quality of patient care to the public. SNIS draws its membership from three areas – interventional neuroradiology, endovascular neurosurgery and interventional neurology. It's the bringing together of these three subspecialties under one umbrella that gives SNIS its diversity and strength.

More information about SNIS is available at **www.snisonline.org**.

Email: **info@snisonline.org**

SNIS Society of NeuroInterventional Surgery