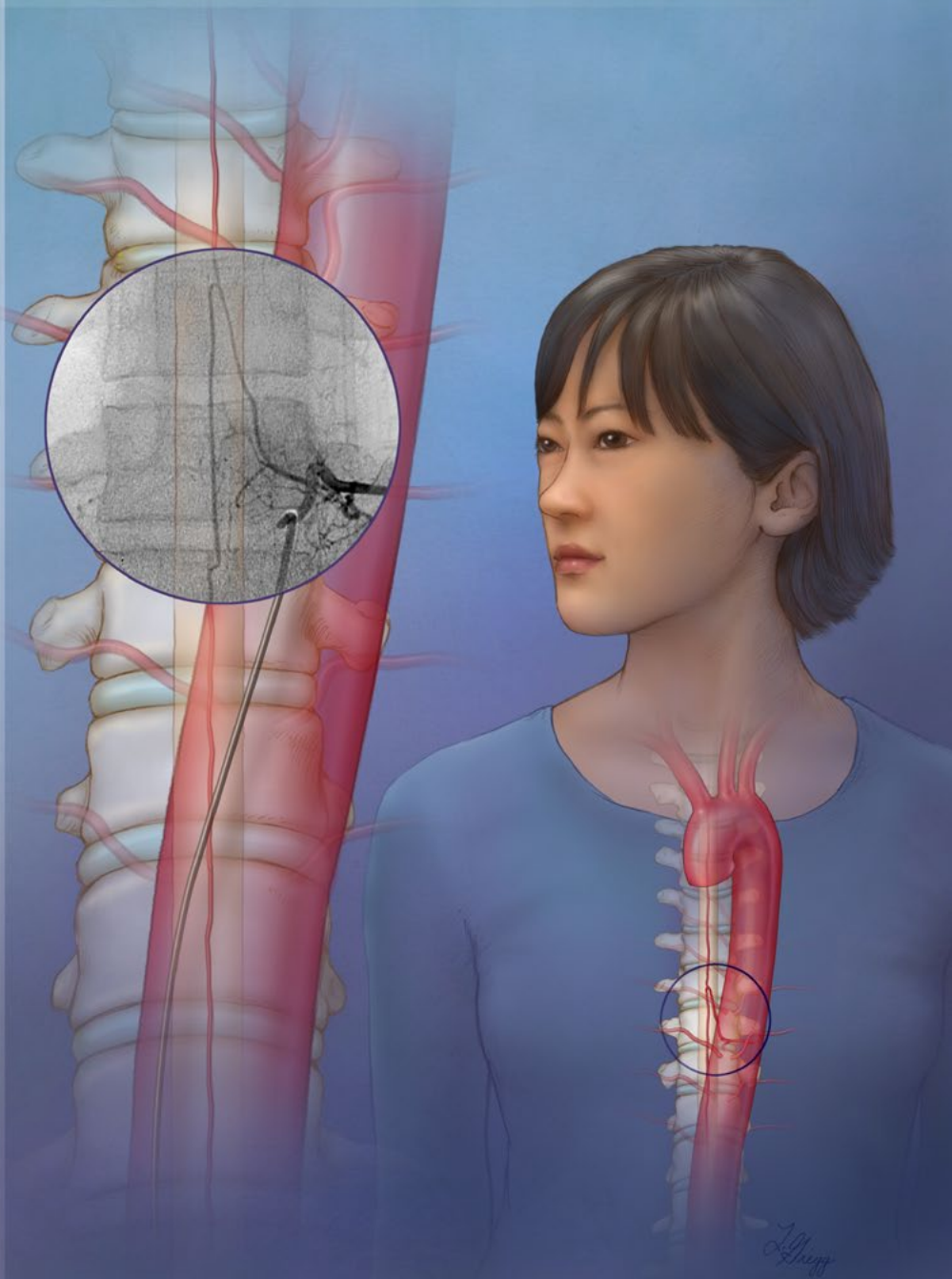


# Spinal Angiography



## Diagnostic Spinal 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 spinal cord. 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](mailto:INR@jhmi.edu)

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**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 healthcare 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 spinal angiogram?

A diagnostic spinal angiogram is a medical procedure that offers an extremely precise evaluation of your blood vessels. Spinal angiography helps to diagnose medical conditions that involve the arteries and veins of the spinal cord. During a spinal 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 travels through the arteries and veins.

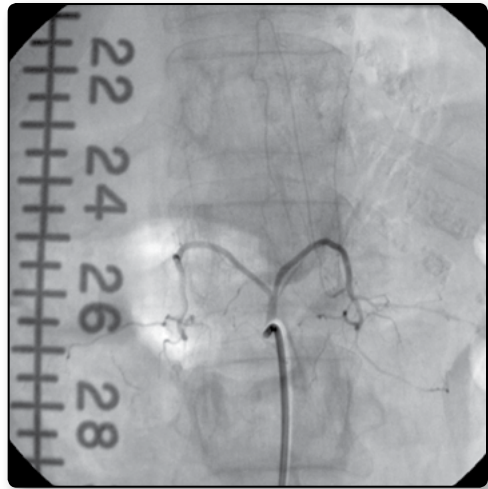


Figure 1. Spinal angiogram

## What conditions can be diagnosed with a spinal angiogram?

The most common conditions diagnosed by spinal angiogram include vascular malformations such as Dural Arteriovenous Fistulas (DAVF) and Arteriovenous Malformations (AVM).

## How should I prepare?

An appointment may be set up with one of our providers a few days before the date of your spinal 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 back 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**:

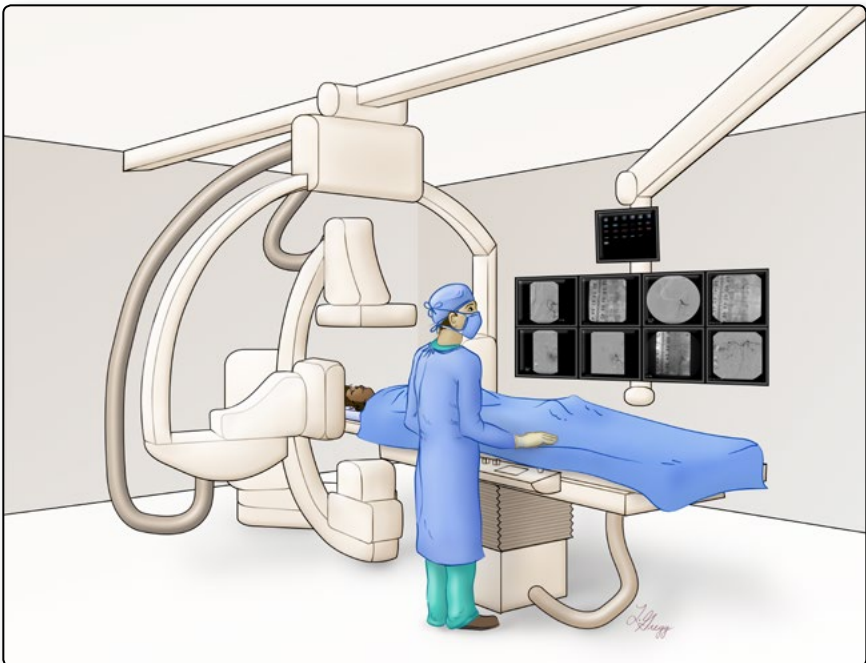


Figure 2. Neuro-angiography suite and equipment

You should have nothing to eat or drink after midnight. Please discuss your medications with the anesthesia team when you meet with them before your procedure.

## How is a spinal angiogram performed?

The procedure is performed in a room specifically designed for angiography of the nervous system, the neuro-angiography suite. 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 spinal vessels (Figure 2). 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 through a small skin incision. You may feel some pressure in the groin area as the catheter is placed in the artery. Accessing the leg artery gives the doctor a direct pathway to the vessels of the spine 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 that lasts for a few seconds. During this time, x-ray pictures of the blood vessels are taken. The doctor will perform multiple injections to obtain images of the small blood vessels of the spinal cord (Figure 4).

It is important to remain still while the contrast travels through the blood vessels so 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.

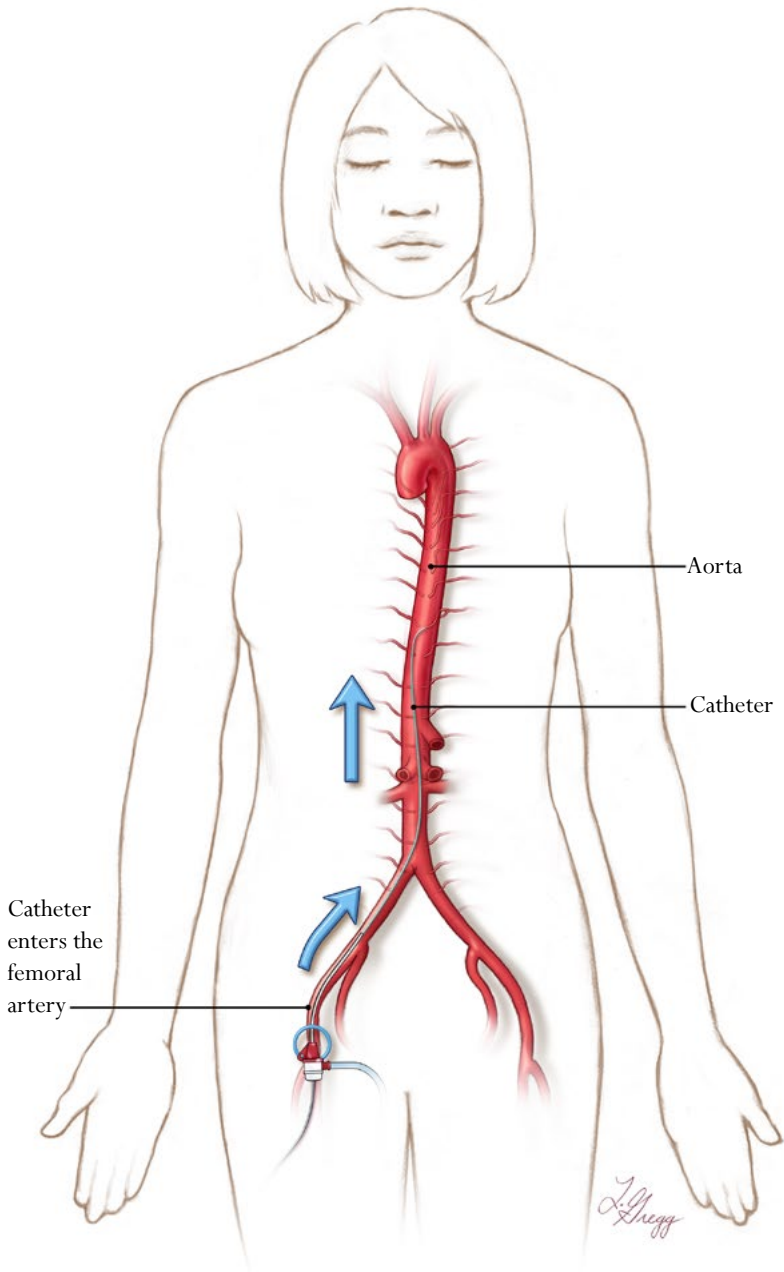


Figure 3. Here we see the path traveled by the catheter from the groin area to the spinal arteries where the contrast is injected.

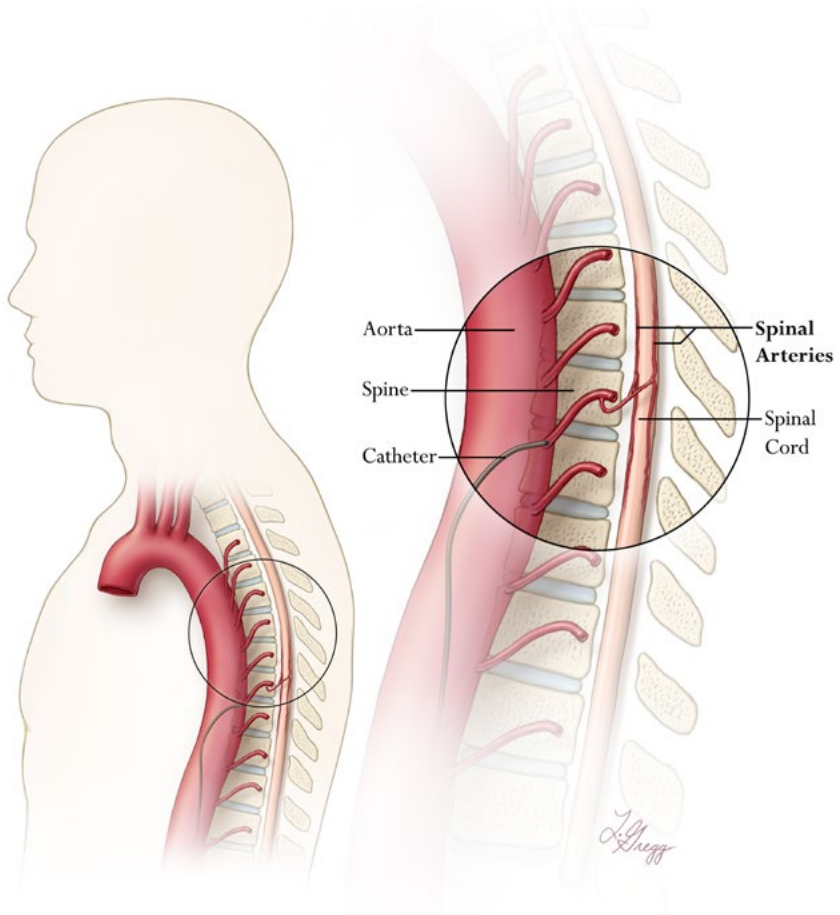


Figure 4. From a side view we can see that the catheter can inject contrast in the spinal arteries while staying inside a large blood vessel called the aorta, away from the heart

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

### **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 carries a small risk of complication,



such as a groin hematoma, your bed will 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. Their role 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.

## How safe is a spinal angiogram?

Diagnostic spinal angiography is very safe when performed by dedicated and experienced neuroangiographers. Our team has reviewed the patient records of 302 men and women who had a spinal angiogram in our service and found that the procedure was safe and effective. An article was published in the peer-viewed journal, *Neurology*.

As is the case with any medical procedure, complications can happen during a spinal angiogram. In the past, the risk of a spinal cord stroke was often cited as a reason to avoid a spinal angiogram. This risk has now been tremendously reduced, and neurological complications occurring during spinal angiography have become very rare. In our review we found no instance of neurological complication. Nonetheless, a detailed and personalized discussion of the potential risks and benefits of the procedure is an essential step in the preparation for a spinal angiogram. This discussion takes place either during a preliminary clinic visit or immediately prior to the procedure.

## Glossary of terms used:

**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

**Fistula:** an abnormal, direct connection between an artery and a vein

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

**Hematoma:** a blood clot resulting from a vessel leaking

**Neuro-angiography:** a diagnostic test used to examine the blood vessels of the brain, neck, spine, and spinal cord

**Spine:** the vertebrae that make up the spinal column; the backbone

**Spinal cord:** the part of the nervous system that is enclosed by the bones of the spine

**Spinal nerves:** the pairs of nerves that come off of both sides of spinal cord

**Stenosis:** narrowing of a blood vessel

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

**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)



Notes and Questions:

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**Interventional Neuroradiology Contacts**

Email: INR@jhmi.edu  
Office Phone: 410-955-8525  
Fax Number: 410-614-8238  
INR Fellow On-Call: 410-283-WIRE  
Website: [www.hopkinsmedicine.org/INR](http://www.hopkinsmedicine.org/INR)

**Administrative Support**

Alejandra Kodsi  
Sonia Garcia

**Nurse Practitioners**

Deborah Smith  
Elizabeth Hendricks

**Attending Physicians**

Philippe Gailloud  
Monica Pearl  
Danielle Eckart

**Research Coordinators**

Amber Jones  
Beatriz Kohler

**Medical Illustrator**

Lydia Gregg

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