

Inferior Vena Cava Filter Placement and Removal

This information is reviewed by a physician with expertise in the area presented and is further reviewed by committees from the American College of Radiology (ACR) and the Radiological Society of North America (RSNA), comprising physicians with expertise in several radiologic areas.

What is Inferior Vena Cava Filter Placement and Removal?

In an inferior vena cava filter placement procedure, interventional radiologists use image guidance to place a filter in the inferior vena cava (IVC), the large vein in the abdomen that returns blood from the lower body to the heart.

Blood clots that develop in the veins of the leg or pelvis, a condition called deep vein thrombosis (DVT), occasionally break up and large pieces of the clot can travel to the lungs. An IVC filter traps large clot fragments and prevents them from traveling through the vena cava vein to the heart and lungs, where they could cause severe complications or even death.

Until recently, IVC filters were available only as permanently implanted devices. Newer filters, called optionally retrievable filters, may be left in place permanently or have the option to be removed from the blood vessel later. This removal may be performed when the risk of clot travelling to the lung has passed. Removal of an IVC filter eliminates any long term risks of having the filter in place. It does not address the cause of the deep vein thrombosis or coagulation. Your referring physician will determine if blood thinners are still necessary.

What are some common uses of the procedure?

Inferior vena cava (IVC) filters are placed in patients who have a history of or are at risk of developing blood clots in the legs, including patients:

- diagnosed with deep vein thrombosis (DVT).

- with pulmonary embolus.
- who are trauma victims.
- who are immobile.
- who have recently had surgery or delivered a baby.

IVC filters are used when patients cannot be successfully treated by other methods, including blood thinning agents.

How should I prepare?

You may have blood drawn prior to your procedure.

Prior to your procedure, your blood may be tested to determine how well your liver and kidneys are functioning and whether your blood clots normally.

You should report to your doctor all medications that you are taking, including herbal supplements, and if you have any allergies, especially to local anesthetic medications, general anesthesia, or to contrast materials (also known as “dye” or “x-ray dye”). Your physician may advise you to stop taking aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs) or a blood thinner for a specified period of time before your procedure.

Also inform your doctor about recent illnesses or other medical conditions.

Women should always inform their physician or x-ray technologist if there is any possibility that they are pregnant. Many imaging tests are not performed during pregnancy so as not to expose the fetus to radiation. If an x-ray is necessary, precautions will be taken to minimize radiation exposure to the baby.

You should eat a light meal the night before your procedure.

You may be instructed 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 may drink clear liquids on the day of your procedure.

If you are diabetic and take insulin, you should talk to your doctor, as your usual insulin dose may need to be adjusted.

You may be asked to remove some or all of your clothes and to wear a gown during the exam. You may also be asked to remove jewelry, eye glasses and any metal objects or clothing that might interfere with the x-ray images.

You may want to have a relative or friend accompany you and drive you home afterward.

What does the equipment look like?

In this procedure, a catheter, x-ray or ultrasound equipment for imaging guidance and an inferior vena cava (IVC) filter may be used.

A catheter is a long, thin plastic tube, about as thick as a strand of spaghetti.

X-ray

The equipment typically used for this examination consists of a radiographic table, an x-ray tube and a television-like monitor that is located in the examining room or in a nearby room. When used for viewing images in real time, the image intensifier (which converts x-rays into a video image) is suspended over a table on which the patient lies. When used for taking still pictures, the image is captured either electronically or on film.

Ultrasound

Ultrasound scanners consist of a console containing a computer and electronics, a video display screen and a transducer that is used to scan the body and blood vessels. The transducer is a small hand-held device that resembles a microphone, attached to the scanner by a cord. The transducer sends out high frequency sound waves into the body and then listens for the returning echoes from the tissues in the body. The principles are similar to sonar used by boats and submarines.

The ultrasound image is immediately visible on a nearby screen that looks much like a computer or television monitor. The image is created based on the amplitude (strength), frequency and time it takes for the sound signal to return from the patient to the transducer.

Other equipment that may be used during the procedure includes an intravenous line (IV) and equipment that monitors your heart beat and blood pressure.

How does the procedure work?

Using image guidance, a catheter is inserted through the skin into a blood vessel in the neck or groin and advanced to the inferior vena cava in the abdomen. The IVC filter is then placed through the catheter and into the vein where it will attach itself to the walls of the blood vessel.

To remove an IVC filter, a special catheter is advanced to the site of the filter in the vena cava. A removable IVC filter has a small hook or knob at one end that enables the catheter to take hold of and withdraw it from the body.

How is the procedure performed?

Image-guided, minimally invasive procedures such as inferior vena cava filter placement and removal are most often performed by a specially trained interventional radiologist in an interventional radiology suite or occasionally in the operating room.

This procedure is often done on an outpatient basis.

You will be positioned on your back.

You will be connected to monitors that track your heart rate, blood pressure and pulse during the procedure.

A nurse or technologist will insert an intravenous (IV) line into a vein in your hand or arm so that sedative medication can be given intravenously. You may also receive general anesthesia.

Your physician will numb the area with a local anesthetic.

The area of your body where the catheter is to be inserted will be shaved, sterilized and covered with a surgical drape.

A very small nick is made in the skin at the site.

Using image-guidance, a catheter (a long, thin, hollow plastic tube) is inserted through the skin into a blood vessel and maneuvered to the treatment site.

A contrast material may be injected into the inferior vena cava to help guide the catheter and verify the placement of the IVC filter in the blood vessel.

At the end of the procedure, the catheter will be removed and pressure will be applied to stop any bleeding. The opening in the skin is then covered with a dressing. No sutures are needed.

Your intravenous line will be removed.
The procedure is usually completed within one hour.

What will I experience during and after the procedure?

Devices to monitor your heart rate and blood pressure will be attached to your body.

You will feel a slight pin prick when the needle is inserted into your vein for the intravenous line (IV) and when the local anesthetic is injected.

The intravenous (IV) sedative will make you feel relaxed and sleepy. You may or may not remain awake, depending on how deeply you are sedated.

You may feel slight pressure when the catheter is inserted but no serious discomfort.

As the contrast material passes through your body, you may get a warm feeling.

You will remain in the recovery room until you are completely awake and ready to return home.

If your IVC filter was inserted through a vein in your neck, you should be able to resume your normal activities immediately. If your filter was inserted through a vein in your groin, you should avoid driving for 24 hours and lifting heavy objects and climbing stairs for 48 hours. Your physician may provide additional post-procedure instructions.

Who interprets the results and how do I get them?

The interventional radiologist can advise you as to whether the procedure was a technical success when it is completed.

Benefits

- No surgical incision is needed—only a small nick in the skin that does not have to be stitched closed.
- The IVC filter allows patients to avoid the side effects of medications called blood thinners that prevent blood clots from forming.

Risks

- Any procedure where the skin is penetrated carries a risk of infection. The chance of infection requiring antibiotic treatment appears to be less than one in 1,000.
- There is a very slight risk of an allergic reaction if contrast material is injected.
- Any procedure that involves placement of 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.
- There is a chance that the IVC filter can lodge in the wrong place, change position or injure a nearby organ.
- The IVC filter may break loose and travel to the heart or lungs causing injury or death.
- Rarely, IVC filters become so filled with clots that they block all flow in the blood vessel, causing swelling in the legs.
- In some cases, retrievable filters cannot be removed.

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