Catheter-directed Thrombolysis



Catheter-directed thrombolysis treats vascular blockages and improves blood flow by dissolving abnormal blood clots. A blood clot, or thrombus, can block off blood supply to certain parts of the body and cause serious damage. Catheter-directed thrombolysis uses x-ray imaging and a catheter to guide special medication or a medical device to the site of a blood clot to dissolve the blockage.

Your doctor will instruct you on how to prepare, including any changes to your medication schedule. Tell your doctor if you are pregnant and discuss any recent illnesses, medical conditions, allergies and medications you take, including herbal supplements and aspirin. Your doctor may advise you to stop taking aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs) or blood thinners several days prior to your procedure. Ask your doctor if you will be required to stay at the hospital overnight. Leave jewelry at home and wear loose, comfortable clothing. You may need to change into a gown for the procedure.

What is Catheter-directed Thrombolysis?

Catheter-directed thrombolysis is a minimally invasive treatment that dissolves abnormal blood clots (http://www.radiologyinfo.org) in blood vessels to help improve blood flow and prevent damage to tissues and organs.

When blood does not flow smoothly through a vessel, it can begin to coagulate (http://www.radiologyinfo.org) , turning from a free-flowing liquid to a semi-solid gel, or blood clots. Blood clots can block off supply to certain parts of the body and cause damage to tissues and organs. Thrombosis and embolization are the two main ways in which a blood clot can cause blockages. Thrombosis occurs when a blood clot forms within a blood vessel and continues to grow until it either partially or completely blocks blood flow in that vessel. Embolization occurs when blood clots from one site dislodge, travel downstream, and lodge in another site resulting in blockage of the downstream vessel. Untreated, a vascular blockage due to thrombosis (http://www.radiologyinfo.org) or embolization, can result in the loss of an organ or extremity, with potentially life-threatening consequences.

A catheter-directed thrombolysis procedure uses x-ray (http://www.radiologyinfo.org) imaging to help guide medication or a medical device to the site of a blood clot and dissolve it.

What are some common uses of the procedure?

Catheter-directed thrombolysis treats blood clots in arteries and veins resulting from any of these causes:

- thrombosis in the vascular bed of the diseased arteries, such as thrombosis in an arm or leg artery that has severe narrowing due to atherosclerosis.
- deep vein thrombosis (http://www.radiologyinfo.org) , a condition in which a blood clot forms in a main vein that returns blood flow from the arms or legs back to the heart and lungs. This type of clot may grow big enough to completely block the vein. This can pose a serious risk if part of it breaks off and travels to the lungs (called pulmonary embolism).
- slowed circulation caused by heart disease, which can allow a blood clot to form in one of the heart's chambers.

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- thrombosis of dialysis fistulae or grafts.
- pulmonary embolism.
- thrombosis of the portal vein and other mesenteric veins.

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.

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.

Dialysis fistula or graft thrombolysis patients may be discharged the same day. However, most other conditions require hospitalization for several days with careful monitoring.

The nurse will give you a gown to wear during the procedure.

What does the equipment look like?

This procedure may use an x-ray camera, catheter (http://www.radiologyinfo.org) , special medications, and a medical device that dissolves blood clots.

This exam typically uses a radiographic table, one or two x-ray tubes, and a video monitor. Fluoroscopy converts x-rays into video 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 used for thrombolysis is a long, thin, hollow plastic tube, about as thick as a strand of spaghetti. These catheters are designed to deliver blood dissolving medications effectively within the blood clot. Medical devices can also dissolve the clots mechanically. Your interventional radiologist will decide which technique is most appropriate for your condition.

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 guidance and a contrast material (http://www.radiologyinfo.org) that helps define the blood vessel, your doctor will

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insert a catheter through the skin into a blood vessel. They will maneuver it to the site of the blockage. The doctor will dissolve the blood clot:

- by delivering medication directly to the blood clot; or
- by positioning a mechanical device at the site to break up the clot.

How is the procedure performed?

A specially trained interventional radiologist (http://www.radiologyinfo.org) most often performs image-guided, minimally invasive procedures such as thrombolysis in an interventional radiology suite or an operating room.

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) .

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.

Guided by x-rays, the doctor will insert a catheter through the skin into a blood vessel and advance it to the area of poor circulation.

The doctor injects a contrast material through the catheter and takes a series of x-rays to pinpoint the location of the clot. Your doctor will review the images and determine how best to treat the clot. The doctor may dissolve the clot with medication, break it up with a mechanical device, or both.

To treat the clot with medication, the doctor leaves the catheter in place and connects it to a special machine that delivers the medication at a precise rate. Clot-dissolving medications are delivered through the catheter over several hours to a few days. It may take up to 72 hours for the clot to dissolve (although most clots dissolve within 24 hours). Medical staff will closely monitor you during this time.

Removing the clot by mechanical device may be done in a single procedure. You may not require a lengthy hospital stay.

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.

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.

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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.

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

Many patients experience some side effects after thrombolysis. Pain is the most common. Your doctor can control it via oral or IV pain medication.

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.

Your doctor will tell you whether you need additional treatment for the condition that caused the clot. You may also need treatment to repair any tissue damage resulting from impaired circulation.

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

- Catheter-directed thrombolysis can greatly improve blood flow. It can reduce or eliminate the related symptoms and effects without the need for more invasive surgery.
- Thrombolysis is a safe, highly effective way of re-establishing circulation blocked by a clot.
- Thrombolysis is less invasive than conventional open surgery, and the hospital stay is relatively brief. Blood loss is less than with traditional surgical treatment and there is no obvious surgical incision.
- No surgical incision is necessary—only a small nick in the skin that does not need stitches.

Risks

- Any procedure that penetrates the skin 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 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 a risk of infection after thrombolysis.
- Whenever anticoagulant or thrombolytic agents (http://www.radiologyinfo.org) are used, there is a risk that bleeding will occur elsewhere in the body. The most serious complication is intracranial (http://www.radiologyinfo.org) bleeding, or bleeding in the brain. Significant bleeding may result in the need for a blood transfusion.
- In some cases, the material that is blocking your vessel may move to another part of the vascular system. Usually this can be treated with further thrombolysis but sometimes may require surgery.
- There is a risk of kidney damage especially in patients with pre-existing kidney disease.

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What are the limitations of Catheter-directed Thrombolysis?

Technically successful thrombolysis requires placement of the catheter in a stable position near the clot. This means that the catheter tip is situated so that the clot-dissolving agent can reach the site of the obstruction. In some cases, the procedure is not technically possible. It is important to understand that clot removal alone cannot repair tissue already damaged by lack of circulation. Further treatment may be required, both for the underlying condition that caused the clot and for any damage to affected organs or other tissues.

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