

Vertebroplasty & Kyphoplasty

Vertebroplasty and kyphoplasty are procedures used to treat painful vertebral compression fractures in the spinal column, which are a common result of osteoporosis. Your doctor may use imaging guidance to inject a cement mixture into the fractured bone (vertebroplasty) or insert a balloon into the fractured bone to create a space and then fill it with cement (kyphoplasty). Following vertebroplasty, about 75 percent of patients regain lost mobility and become more active.

Your doctor will likely first evaluate your condition using diagnostic imaging or a physical exam and will instruct you on how to prepare. Tell your doctor if there's a possibility you are pregnant and discuss any recent illnesses, medical conditions, allergies and medications you're taking. Your doctor may advise you to stop taking aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs) or blood thinners several days prior to your procedure and instruct you not to eat or drink anything several hours beforehand. Take regular medication with sips of water. Leave jewelry at home and wear loose, comfortable clothing. You may be asked to wear a gown. If you are not to be admitted to the hospital, plan to have someone drive you home afterward.

What is Vertebroplasty & Kyphoplasty?

Vertebroplasty and kyphoplasty are minimally invasive procedures for the treatment of painful vertebral compression fractures (VCF), which are fractures involving the vertebral bodies that make up the spinal column.

When a vertebral body fractures, the usual rectangular shape of the bone becomes compressed, causing pain. These compression fractures may involve the collapse of one or more vertebrae in the spine and are a common result of osteoporosis. Osteoporosis is a disease that results in a loss of normal bone density, mass and strength, leading to a condition in which bones become increasingly porous, and vulnerable to breaking easily. Vertebrae may also become weakened by cancer.

For a vertebroplasty, physicians use image guidance, typically fluoroscopy, to inject a cement mixture into the fractured bone through a hollow needle. During kyphoplasty, a balloon is first inserted into the fractured bone through the hollow needle to create a cavity or space. The cement is injected into the cavity once the balloon is removed.

What are some common uses of the procedures?

Vertebroplasty and kyphoplasty are used to treat painful vertebral compression fractures in the spine, most often the result of osteoporosis.

Typically, vertebroplasty and kyphoplasty are recommended after less invasive treatments, such as bed rest, a back brace or pain medication, have been ineffective. Vertebroplasty and kyphoplasty can be performed immediately in patients with problematic pain requiring hospitalization or for conditions that limit bed rest and pain medications.

Vertebroplasty and kyphoplasty are also performed on patients who:

- are elderly or frail and will likely have impaired bone healing after a fracture
- have vertebral compression due to a malignant tumor
- suffer from osteoporosis due to long-term steroid treatment or a metabolic disorder

Vertebroplasty and kyphoplasty should be completed within eight weeks of the acute fracture for the highest probability of successful treatment.

How should I prepare?

A clinical evaluation will be performed to confirm the presence of a compression fracture that may benefit from treatment with vertebroplasty or kyphoplasty. The evaluation may include:

- diagnostic imaging
- blood tests
- a physical exam
- spine x-rays
- radioisotope bone scan
- magnetic resonance imaging (MRI)
- computed tomography (CT)

You may be given bone-strengthening medication during treatment.

Tell your doctor about all the medications you take, including herbal supplements. List any allergies, especially to local anesthetic, general anesthesia, or contrast materials. Your doctor may tell you to stop taking aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs) or blood thinners before your procedure.

Women should always tell their doctor and technologist if they are pregnant. Doctors will not perform many tests during pregnancy to avoid exposing the fetus 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 need to have blood drawn for tests prior to the procedure to determine if your blood clots normally.

On the day of the procedure, you should be able to take your usual medications with sips of water or clear liquid up to six hours before the procedure. You should avoid drinking juice, cream and milk. Follow your doctor's instructions.

In most cases, you should take your usual medications, especially blood pressure medications. Take these with sips of water on the morning of your procedure.

Other than medications, your doctor may tell you to not eat or drink anything for several hours before your procedure.

Plan to have someone drive you home after your procedure.

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

What does the equipment look like?

For vertebroplasty and kyphoplasty procedures, x-ray equipment, a hollow needle or tube called a trocar, orthopedic cement, and a cement delivery device are used.

For kyphoplasty, a device called a balloon tamp is also used to make room for the balloon catheter.

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.

The orthopedic cement includes an ingredient called polymethylmethacrylate (PMMA). Its physical appearance resembles toothpaste, which hardens soon after placement in the body.

This procedure may use other equipment, including an intravenous line (IV), ultrasound machine and devices that monitor your heart beat and blood pressure.

How does the procedure work?

When a vertebra breaks or fractures, bone fragments develop. Pain occurs when these fragments slide or rub against each other or protrude into the spinal cord.

Vertebroplasty involves injecting the bone with a cement mixture to fuse the fragments, strengthen the vertebra and provide pain relief.

First, the skin is numbed with a local anesthetic. Then, using imaging guidance, the hollow needle or trocar is passed through the skin into the vertebral body for injection of the cement mixture into the vertebra.

In kyphoplasty, after numbing the skin locally, a balloon is inserted through the trocar into the fractured vertebra where it is inflated to create a cavity for cement injection. The balloon is removed prior to injecting cement into the cavity that was created by the balloon.

How is the procedure performed?

Image-guided, minimally invasive procedures such as vertebroplasty and kyphoplasty are most often performed by a specially trained interventional radiologist or neuroradiologist in an interventional radiology or neuroradiology suite, or occasionally in the operating room.

This procedure is often done on an outpatient basis. However, some patients may require admission following the procedure. Ask your doctor if you will need to be admitted.

The doctor or nurse may connect you to monitors that track your heart rate, blood pressure, oxygen level, and pulse.

A nurse or technologist will insert an intravenous (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.

Your doctor may provide medications to help prevent nausea and pain and antibiotics to help prevent infection.

You will be positioned lying face down for the procedure.

The area through which the hollow needle, or trocar, will be inserted will be shaved, sterilized with a cleaning solution and covered with a surgical drape.

A local anesthetic is then injected into the skin and deep tissues, near the fracture.

The doctor will make a very small skin incision at the site.

Using x-ray guidance, the trocar is passed through the spinal muscles until its tip is precisely positioned within the fractured vertebra.

In vertebroplasty, the orthopedic cement is then injected. Medical-grade cement hardens quickly, typically within 20 minutes. The trocar is removed after the cement is injected.

In kyphoplasty, the balloon tamp is first inserted through the needle and the balloon is inflated, to create a hole or cavity. The balloon is then removed and the bone cement is injected into the cavity created by the balloon.

X-rays and/or a CT scan may be performed at the end of the procedure to check the distribution of the cement.

The doctor applies pressure to prevent any bleeding and covers the opening in the skin with a bandage. No sutures are necessary.

This procedure is usually completed within one hour. It may take longer if more than one vertebral body level is being treated.

The doctor or nurse will remove your IV line before you go home.

What will I experience during 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.

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.

The treatment area of your back will be cleaned, shaved and numbed.

During the procedure you will be asked questions related to your comfort. It is important for you to be able to tell your doctor whether you are feeling any pain.

The longest part of vertebroplasty and kyphoplasty procedures involves setting up the equipment and making sure the needle is perfectly positioned in the collapsed vertebral body.

You may feel a tapping sensation during the procedure as the trocar is advanced into the bone.

You may not drive after the procedure, but you may be driven home if you live close by. Otherwise, an overnight stay at a nearby hotel is advised.

You will be advised to increase your activity gradually and resume all your regular medications. At home, patients may return to their normal daily activities, although strenuous exertion, such as heavy lifting, should be avoided for at least six weeks.

If you take blood thinners, check with your doctor about restarting this medication the day after your procedure.

Pain relief is immediate for some patients. In others, pain is eliminated or reduced within two days. Pain resulting from the procedure will typically diminish within two to three days.

For two or three days afterward, you may feel a bit sore at the point of the needle insertion. You can use an icepack to relieve any discomfort but be sure to protect your skin from the ice with a cloth and ice the area for only 15 minutes per hour. Your bandage should remain in place for 48 hours. Do not immerse the bandage in water for 48 hours. This is to prevent infection. Taking showers is allowed.

Who interprets the results and how do I get them?

Approximately one hour after the procedure, you should be able to walk. The interventional radiologist is often able to advise you as to whether the procedure was a technical success at that point.

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

- Vertebroplasty and kyphoplasty can increase a patient's functional abilities and allow return to the previous level of activity without any form of physical therapy or rehabilitation.
- These procedures are usually successful at alleviating the pain caused by a vertebral compression fracture; many patients feel significant relief almost immediately or within a few days. Many patients become symptom-free.
- Following vertebroplasty, about 75 percent of patients regain lost mobility and become more active, which helps combat osteoporosis. After the procedure, patients who had been immobile can get out of bed, and this can help reduce their risk of pneumonia. Increased activity builds more muscle strength, further encouraging mobility.
- Usually, vertebroplasty and kyphoplasty are safe and effective procedures.
- 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.
- A small amount of orthopedic cement can leak out of the vertebral body. This does not usually cause a serious problem, unless the leakage moves into a potentially dangerous location such as the spinal canal or the blood vessels of the lungs.
- Other possible complications include infection, bleeding, increased back pain and neurological symptoms such as numbness or tingling. Paralysis is extremely rare.
- Approximately 10 percent of patients may develop additional compression fractures after vertebroplasty or kyphoplasty. When this occurs, patients usually have relief from the procedure for a few days but develop recurrent pain soon thereafter.
- There is a low risk of allergic reaction to the medications.

What are the limitations of Vertebroplasty & Kyphoplasty?

Vertebroplasty and kyphoplasty are **not**:

- used for herniated disks or arthritic back pain.
- generally recommended for otherwise healthy younger patients, mostly because there is limited experience with cement in a vertebral body for longer time periods. These patients also tend to heal faster than elderly patients or those with osteoporosis.
- a preventive treatment to help patients with osteoporosis avoid future fractures. It is used only to repair a known, non-healing compression fracture if it is due to a recent fracture.
- used to correct an osteoporosis-induced curvature of the spine, but it may keep the curvature from worsening if it is due to a recent fracture.
- ideal for someone with severe emphysema or other lung disease because it may be difficult for such individuals to lie facedown for the one to two hours vertebroplasty requires. Special accommodations may be made for patients with these conditions.
- for patients with a healed (chronic) vertebral fracture.
- appropriate for patients with young healthy bones or those who have suffered a fractured vertebra in an accident.
- suitable for patients with spinal curvature such as scoliosis or kyphosis that results from causes other than osteoporosis.
- applicable for patients who suffer from spinal stenosis or herniated disk with nerve or spinal cord compression and loss of neurologic function.

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