Vertebroplasty & Kyphoplasty

What is Vertebroplasty & Kyphoplasty?

Vertebroplasty and kyphoplasty are minimally invasive procedures for the treatment of 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 are increasingly porous, and vulnerable to breaking. Vertebrae may also become weakened by cancer.

In vertebroplasty, physicians use image guidance to inject a cement mixture into the fractured bone through a hollow needle. In kyphohplasty, 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 is recommended after less invasive treatments, such as bed rest, a back brace or pain medication, have been ineffective, or once medications begin to cause undesired side effects, such as stomach ulcers or changes in mental status. Vertebroplasty can be performed immediately in patients with problematic pain requiring hospitalization or for conditions that limit bed rest and pain medications.

Vertebroplasty is also performed on patients who:

- are too elderly or frail to tolerate open spinal surgery, or whose bones are too weak for surgical repair
- have vertebral compression due to a malignant tumor
- are younger, with 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 including diagnostic imaging, blood tests, a physical exam, spine x-rays and a radioisotope bone scan or magnetic resonance (MR) imaging will be done to confirm the presence of a compression fracture that may benefit from treatment with vertebroplasty or kyphoplasty.

You may be given bone-strengthening medication during treatment.

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 containing iodine (sometimes referred to as "dye" or "x-ray dye"). Your physician may advise you to stop taking aspirin, nonsteroidal anti-inflammatory drugs (NSAIDs) or blood thinners for a specified period of time before your procedure.

Women should always inform their physician and 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. See the Safety page (www.RadiologyInfo.org/en/safety/) 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 three hours before the procedure. You should avoid drinking orange juice, cream and milk.

In most cases, you should take your usual medications, especially blood pressure medications. These may be taken with sips of water on the morning of your procedure.

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

You should plan to have a relative or friend drive you home after your procedure.

You will be given 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 solvent are used. In addition, barium or another substance may be added to the cement to make it radiopaque (appear on x-ray).

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

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. Fluoroscopy, which converts x-rays into video images, is used to watch and guide progress of the procedure. The video is produced by the x-ray machine and an image intensifier that is suspended over a table on which the patient lies.

The orthopedic cement includes an ingredient called polymethylmethacrylate (PMMA). Its physical appearance resembles toothpaste.

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

A Foley catheter may be placed in your bladder.

How does the procedure work?

Vertebroplasty involves injecting a cement mixture into the empty spaces within weakened vertebrae to strengthen them and provide pain relief.

Using image-guidance, a hollow needle called a trocar is passed through the skin into the vertebral body for injection of the cement mixture into the vertebra.

In kyphoplasty, a balloon is first 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. Please consult with your physician as to whether or not you will be admitted.

You will be positioned lying face down for the procedure.

You may 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. Alternatively, you may receive general anesthesia.

You may be given medications to help prevent nausea and pain, and antibiotics to help prevent infection.

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

A local anesthetic is then injected into the muscles under the skin, near the fracture.

A very small nick is made in the skin 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. An examination called intraosseous venography may be performed to confirm safe needle placement within the fractured bone. Many interventional radiologists proceed directly to vertebroplasty or kyphoplasty without intraosseous venography.

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

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 trocar is removed after the cement is injected.

Pressure will be applied to prevent any bleeding and the opening in the skin is covered with a bandage. No sutures are needed.

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

Your intravenous line will be removed.

What will I experience during 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.

If the case is done with sedation, 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.

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

During the procedure you will be asked questions. 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 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.

Bed rest is recommended for the first 24 hours following vertebroplasty and kyphoplasty, though you may get up to use the bathroom. 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 weeks.

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 several days (even during showers).

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. In some cases, it can take a few days for the doctor to be able to make this assessment.

Your interventional radiologist may recommend a follow-up visit after your procedure or treatment is complete.

The visit may include a physical check-up, imaging procedure(s) and blood or other lab tests. During your follow-up visit, you may discuss with your doctor any changes or side effects you have experienced since your procedure or treatment.

What are the benefits vs. risks?

Benefits

- Vertebroplasty and kyphoplasty can increase a patient's functional abilities, allow return to the previous level of activity without any form of physical therapy or rehabilitation and stabilize the vertebra.
- These procedures are usually successful at alleviating the pain caused by a vertebral compression fracture; many patients feel significant relief almost immediately. 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, reducing 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 needed—only a small nick in the skin that does not have to be stitched closed.

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.
- 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.
- Other possible complications include infection, bleeding, increased back pain and neurological symptoms such as numbness or tingling. Paralysis is extremely rare.

- There is a risk of allergic reaction to the contrast material used for intraosseous venography or to help visualize the balloon as it inflates on the x-ray image.

What are the limitations of Vertebroplasty & Kyphoplasty?

Vertebroplasty is **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.
- a preventive treatment to help patients with osteoporosis avoid future fractures. It is used only to repair a known, non-healing compression fracture.
- used to correct an osteoporosis-induced curvature of the spine, but it may keep the curvature from worsening.
- 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.

Kyphoplasty is **not** appropriate for:

- patients with young healthy bones or those who have suffered a fractured vertebra in an accident.
- patients with spinal curvature such as scoliosis or kyphosis that results from causes other than osteoporosis.
- patients who suffer from spinal stenosis or herniated disk with nerve or spinal cord compression and loss of neurologic function not associated with a VCF.