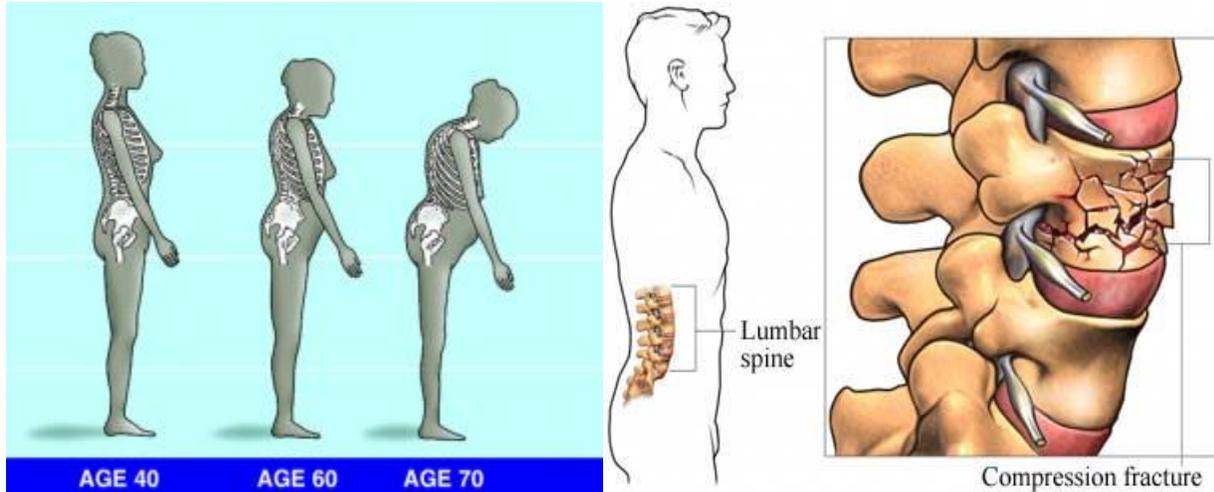


Kyphoplasty and Vertebroplasty

The World Health Organization has shown that one in two senior citizens will experience an osteoporosis related fracture at some point. One of the most common areas for these fractures to occur is in the spine, where they are known as vertebral compression fractures (VCF).

Are all vertebral compression fractures painful?



The answer is a definite no. About half of vertebral compression fractures cause no pain at all and are effectively silent. If several silent vertebral compression fractures occur, a person may end up with kyphosis (see picture).

For those who have a VCF that is painful, it may be debilitating or it may represent a persistent ache that is really more annoying than disabling.

What treatments are available for compression fractures?

Other than vertebroplasty and kyphoplasty, treatments available for compression fractures include medications along with spinal bracing. Various medications available for pain control include Tylenol, anti-inflammatories, and opioid medications on a short-term basis for pain relief. In addition, the fracture often causes muscle spasms as a protective mechanism, so muscle relaxers may be of benefit as well.

Spinal bracing includes what is known as a Jewett brace. This brace helps hold the spine in a more upright position and may stabilize the area to provide relief. The typical treatment regimen for a symptomatic vertebral compression fracture is medications and bracing for 4 to 6 weeks, and if ineffective then a vertebroplasty or kyphoplasty is indicated.

What exactly is a vertebroplasty or a kyphoplasty?

In the 1980s and 90s, vertebroplasty was begun as a procedure to help relieve the pain of spinal vertebral fractures from cancer. The procedure worked exceptionally well for metastatic cancer fractures and for multiple myeloma (a primary bone cancer).

As a result, in the 1990's a crossover occurred and the procedure began usage for regular vertebral compression fractures due to osteoporosis.

The vertebroplasty procedure involves inserting bone cement into the vertebral compression fracture to stabilize the break. Essentially, it is an internal brace that hardens within a half hour and is able to provide immediate and substantial pain relief.

In 1998, kyphoplasty was approved by the FDA as a variation on vertebroplasty. The main principle of the treatment is the same as vertebroplasty, as bone cement is injected into the fracture. However, for the kyphoplasty procedure, prior to bone cement insertion a balloon is inflated in the fracture to create a bony void. This allows more bone cement to be injected and also placing it under lower pressure. With a vertebroplasty, as there is no bony void the cement is placed under higher pressure.

Who do these procedures benefit?

The indication for a vertebroplasty or kyphoplasty is an individual with a vertebral compression fracture (VCF) who has failed initial conservative treatment. It is not usually performed immediately after the fracture occurs. Rather, an initial trial period of medication management and bracing is typically tried first.



Fractured vertebral body



Balloon Kyphoplasty

The procedure is questionable in younger patients with compression fractures. For one, compression fractures from osteoporosis are unusual in those under age 55. The best track record is in those over the age of 60, as that is where the research has been performed.

If a compression fracture is seen on imaging studies but is not painful, then the procedure is not indicated. Just doing it because a fracture is visible will not help patients. If a person is having back pain and a fracture is seen on x-rays, an MRI can show if the fracture is still “active”. If it “lights up” on the scan, then it is still active and trying to heal. If there is no activity on the MRI, it may be that the pain is unrelated to the fracture seen on the x-ray.

How are these procedures performed?

Pain management doctors perform vertebroplasty and kyphoplasty as an outpatient procedure. They may be performed under general anesthesia or IV sedation. Patients are placed prone for the procedure, which means on the abdomen facing down.



This is a 3 level kyphoplasty procedure.

Fluoroscopy is used for the procedure, which is a real-time form of x-ray. Some pain clinics actually will use two fluoroscopy machines during the procedure for increased accuracy.

Both procedures start out the same way. The x-ray helps show the point of entry and numbing medicine is placed just under the skin and in the soft tissues down to the insertion point. The incisions are miniscule.

A metal needle is placed through the bone on the outside of the spinal canal, called the pedicle. It is slowly positioned into the fracture on both sides of the spine.

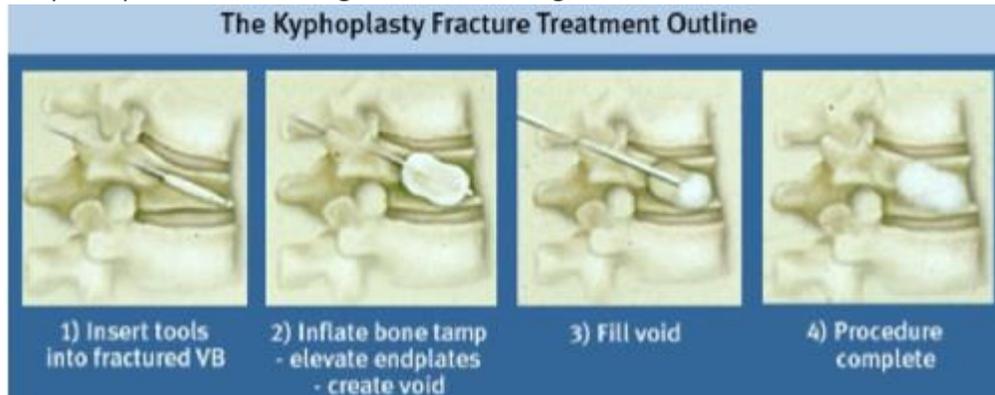
Once the positioning is finished, catheters are placed into these areas and this is where the two procedures differ dramatically. For a vertebroplasty procedure, bone cement is mixed up and while it is still doughy is injected under pressure into the fracture. The cement has contrast in it to make sure that it doesn't extravasate from its desired position.

The bone cement gets very hot as it hardens. It is called an exothermic reaction. This is another reason it is very important for the cement not to be close to the spinal cord or nerve roots during the procedure as it can cause damage.

For the kyphoplasty procedure, a saline filled balloon is inflated on both sides of the fracture to create a bony void. Once this is accomplished, bone cement is placed under very low pressure into

the bony void. A kyphoplasty is actually better at obtaining some of the height back that was lost from the fracture.

Once the cement injection is completed, it is allowed to harden for approximately 20 minutes and tiny Band-Aids are placed over the minimal incisions. The patient is awakened, a motor exam is performed, and the patient is monitored for a while to ensure stable vital signs and no allergic reaction. Usually the patient is sent home the same day, however, the decision may be made to keep the patient for one night for monitoring.



What are the outcomes of the procedures?

There have been quite a few studies performed looking at vertebroplasty and kyphoplasty for compression fractures. Most studies have shown excellent benefit of 85 to 90% pain relief that was very quickly obtained ([Example of a Study](#)). These have been large studies of hundreds of patients. There have been a couple studies over the last five years questioning the benefit of vertebroplasty and kyphoplasty (NEJM 2009). These studies have been heavily debated, as there were issues with the control procedures used and the fact that older fractures were treated as well. Even the lead researcher on the study admitted despite his study's questionable results, he still performs the procedure ([Reference](#)).

Because of the dramatic results and most of the studies for pain relief show it works great, pain management doctors continue to perform the procedure to obtain the excellent outcomes. At times, patients will continue to have some muscle aching for a few weeks after the procedure. In addition, patients may end up with a fracture in an adjacent level soon after the initial procedure. This happens 15-20% of the time (Curr Rev Musculoskelet Med. 2008).

What are the risks of vertebroplasty and kyphoplasty?

The risks of these procedures are small but real. There's a minor risk of infection and bleeding. If the patient is on blood thinners prior to the procedure, they should be stopped about 5 to 7 days before. Your pain clinic will tell you the exact time frame.

There is a risk of neurologic injury from the procedure. Rarely, bone cement will leak out from where it was initially placed and end up in the spinal canal or outside the vertebral body on the sides. As the bone cement hardens, it goes through and exothermic heat reaction. This can damage the spinal cord and nearby nerve roots if it extravasates from inside the bone.

One of the biggest risks of the procedure is that it may simply not work. About 10% of the time, pain relief is inadequate after the procedure. Another problem is if the person has significant

osteoporosis, a fracture at an adjacent level may be quickly seen after the initial procedure. This happens 15-20% of the time.