Thoracic Compression Fractures
A Patient's Guide to Thoracic Compression Fractures

Introduction

The bones, or vertebrae, that make up your spine are very strong, but sometimes a vertebra can
fracture - just like any other bone in your body. Vertebra fractures are usually due to conditions
such as: osteoporosis (a condition which weakens the bones), a very hard fall, excessive
pressure, or some kind of physical injury.

When a bone in the spine collapses, it is called a vertebral compression fracture. These fractures
happen most commonly in the thoracic spine (the middle portion of the spine), particularly in the
lower vertebra of the thoracic spine.

The purpose of this information is to help you understand:

- The anatomy of the spine relating to compression fractures
- The causes and symptoms of compression fractures
- How the condition is diagnosed
- The treatments available for the condition
- Some complications associated with compression fractures

Anatomy

To best understand lumbar spine injuries, it helps to know some anatomy of the overall spine.
Compression fractures of the spine usually occur at the bottom part of the thoracic spine (T11 and T12) and the first vertebra of the lumbar spine (L1).

Compression fractures of the spine generally occur from too much pressure on the vertebral body. This usually results from a combination of bending forward and downward pressure on the spine. For example, falling from a chair in a sitting position on the floor usually causes your head to go forward at the same time your buttocks hit the floor. This causes the spine to bend forward concentrating the pressure on the front part of the spine - the vertebral bodies. The fracture occurs when the bone actually collapses and the front (anterior) part of the vertebral body forms a wedge shape. The cancellous bone on the inside of the vertebral body is crushed, or compressed. In very severe compression fractures, the back of the vertebral body may actually protrude into the spinal canal and put pressure on the spinal cord. Fortunately, this is not a common occurrence.

**Causes**

There is not one single cause of compression fractures, though the word compression would indicate that the fracture occurs because of too much pressure being placed on the bone. If the bone is too weak to hold normal pressure, it may not take much pressure to cause the vertebral body to collapse. Most healthy bones can withstand a lot of pressure and the spine will bend to absorb the shock. However, if the force is too great for the vertebrae to sustain, one or more of them can fracture. To understand a fracture, think about bending a pencil. If you place pressure on the pencil, it will bend a little then go back into place when the pressure is gone. However, if you bend the pencil too far - past its breaking point, it will crack or break apart. Similarly, the amount a vertebra collapses/fractures depends upon the amount of pressure it has to withstand.

A common cause of compression fractures is the disease osteoporosis. This disease thins the bones, often to the point that they are too weak to bear normal pressure. The thinning bones can collapse during normal activity, leading to a spinal compression fracture. In fact, spinal compression fractures are the most common type of osteoporotic fractures. Forty percent of all women will have at least one by the time they are 80 years old. These vertebral fractures can permanently alter the shape and strength of the spine. The fractures usually heal on their own and the pain goes away. However, sometimes the pain can persist if the crushed bone fails to heal adequately.

In severe cases of osteoporosis, actions as simple as bending forward can be enough to cause a "crush fracture", or spinal compression fracture. This type of vertebral fracture causes loss of height and a humped back - especially in elderly women. This disorder (called kyphosis or a "dowager's hump") is an exaggeration of your spine, that causes the shoulders to slump forward and the top of your back to look enlarged and humped.
Trauma to the spinal vertebrae can also lead to minor or severe fractures. Such trauma could come from a fall, a forceful jump, a car accident, or any event that stresses the spine past its breaking point.

Another cause of vertebral fractures is a metastatic disease. Metastasis is a term that refers to the spread of cancer cells into other areas of the body. The bones of the spine are a common place for many types of cancers to spread. A compression fracture of the spine that appears for little or no reason may be the first indication that an unrecognized cancer has spread to the spine. The cancer causes destruction of part of the vertebra, weakening the bone until it collapses. This is a sign that something going on internally is harming the bones.

**Symptoms**

If the fracture is caused by a sudden, forceful injury, you will probably feel severe pain in your back, legs, and arms. You might also feel weakness or numbness in these areas if the fracture injures the nerves of the spine. If the bone collapse is gradual - such as a fracture from bone thinning, the pain will usually be milder. There might not be any pain at all until the bone actually breaks.

**Diagnosis**

In order for a fracture to be diagnosed, you will need to visit a health care provider. Before your doctor can diagnose your condition and design a treatment plan, a complete history and physical examination are necessary. There are many possible internal causes of pain. It is important to determine what is and is not the root of the problem. After the physician has a better idea of what is causing your discomfort, diagnostic tests of some sort may be recommended.

**History**

First, you will be asked for a complete history of your condition. This may begin by filling out a written form that asks you a number of questions relating to your pain. The more information you share with your provider, the easier your problem will be to diagnose. Your history is important because it helps your doctor understand: when the pain began, anything that could have caused an injury, physical factors that might be causing the pain, and any family history of similar problems. After reading through your written history, your physician will ask more questions that relate to the information you have given.

Some typical questions include:

- When did the pain begin?
- Was there an injury that could be related to the pain?
- Where do you feel the pain? What is the intensity?
- Does the pain radiate to other parts of the body?
- What factors make the pain feel better or worse?
- Have you had problems with your bladder or bowels?
- Is there a history of osteoporosis in your family?
Physical Examination

After taking your history, the physician will give you a physical examination. This allows the doctor to rule out possible causes of pain and to try to determine what is causing your problems. The areas of your body that will be examined depend upon where you are experiencing pain - neck, lower back, arms, legs, etc. Neurological problems are rare except in younger patients who have experienced a violent injury, such as a car crash.

If a compression fracture is suspected, the doctor will also test for point tenderness near specific vertebrae. Testing specific areas for unusual tenderness allows the doctor to narrow down the cause of your pain.

If a fracture is thought to exist, an X-ray of the spine will generally confirm its presence. An X-ray is a painless process that uses radioactive materials to take pictures of bone. X-rays show bones, but not much soft tissue, so X-rays will definitely be used if fractures are suspected.

If there is a fracture, your doctor may also suggest a CAT scan to make sure that the fracture is stable. The CAT scan is an X-ray test similar to both the MRI and a regular X-ray, because it can show both bones and soft tissues. CAT scans are also able to produce X-ray "slices" taken of the spine, so each section can be examined separately. The scan forms a set of cross-sectional images. With a compression fracture, an up and down perspective of the spine will be pieced together for examination of stability. The CAT scan is usually done to see if the nerves are in danger from the fracture.

A neurological exam will also be given. This allows the doctor to test your neurological responses, such as your reflexes, muscles, and sensory perception. Abnormalities on the neurological examination can point to nerve damage. The nerves of the spinal cord carry messages from the brain to the rest of the body. If there is damage to the spinal nerves, your body movement and neurological responses will be affected.

If there is a chance that nerves are involved in the fracture, or if there is some question about what is causing the pain, an MRI might be recommended. The MRI scan is a fairly new test that does not use radiation. By using magnetic and radio waves, the MRI creates computer-generated images. The MRI is able to cut through multiple layers of the spine and show any abnormality of soft tissues, such as nerves and ligaments.

A nuclear bone scan is another diagnostic test that might be ordered. This test helps determine the age of a fracture. If the fracture is old and there appear to be other fractures that have healed, this may indicate osteoporosis (bone-thinning disease) is causing the fractures. This is important in older patients, particularly women. In this case, treatment of the fracture will include preventive measures to try to stop other vertebral fractures from occurring. Such treatment could include: calcium supplements, increased vitamin D, weight-bearing exercises, and hormone replacement therapy for women.

For more information on all these tests, you may wish to review the document entitled:
Diagnostic Tests for Spine Problems

**Treatment**

The most common treatments for a thoracic compression fracture are: pain medications, decreasing activity, and bracing. In rare cases, surgery may also be necessary.

**Pain Medications**

Mild pain medications can reduce pain when taken properly. However, remember that medications will not help the fracture to heal. The medication is simply to help with pain control.

To review the types of pain medications used for back pain please review:

- [Medications for Back Pain](#)

**Decreasing Activity**

You will most likely have to limit your normal activities. You should avoid any strenuous activity or exercise. You will definitely need to avoid heavy lifting and anything else that might place too much strain on your fractured vertebra. If you are elderly, your doctor might also put you on bed rest. Older bones take longer to heal and are typically thinner and weaker than younger bones. Treat this fracture as you would any other broken bone - carefully and seriously!

**Bracing**

Another common form of treatment for some types of vertebral compression fractures is bracing. Your doctor may prescribe a back support (often officially called an orthosis). The brace supports the back and restricts movement; just as an arm brace would support a fracture of the arm. The brace is well molded to conform tightly to your body, like a cast for any other fracture. The brace used to treat a compression fracture of the spine is designed to keep you from bending forward. It holds the spine in hyperextension (meaning more extension, or straightening, than normal). This takes most of the pressure off the fractured vertebral body, and allows the vertebrae to heal. It also protects the vertebra and stops further collapse of the bone.

Vertebral fractures usually take about three months to fully heal. X-rays will probably be taken monthly to check on the healing progress.

To learn more about the different types of braces available to treat compression fractures you may wish to review the document entitled:

- [Back and Neck Braces](#)
Surgery

Surgery to fix most spinal compression is rarely needed. With vertebral fractures, surgery, or internal fixation, is only considered if there is evidence of sudden and serious instability of the spine. For instance, if the fracture leads to a loss of 50% of the vertebral body's height, surgery might be necessary to prevent damage that is more serious to the spinal nerves.

If your doctor feels that surgery is necessary to treat your fracture, he or she will probably suggest using some type of internal fixation to hold the vertebrae in the proper position while the bone heals. If there are signs that there is too much pressure on the spinal cord, the bone fragments pushing into the spinal cord may also need to be removed.

Anterior Approach

When surgery is necessary to remove pressure from the spinal cord, your surgeon may suggest an operation from the front of the spine. During an anterior approach an incision is made in the chest to allow the surgeon to see the front of the spine and locate the vertebra that has been crushed. One the vertebra has been located, the bone fragments may be removed to remove the pressure from the spinal cord. Once this has been accomplished a spine fusion is usually performed.

The anterior spine fusion is performed by replacing the crushed vertebra with bone graft to hold the vertebra above and below the fractured vertebra apart. The bone graft eventually grows together with the vertebra above and below and fuses the vertebra together into one bone. During the operation a combination of metal screws, metal plates and metal rods are used to hold the spine in the correct position to allow the fusion to occur over the next several months. These metal implants will remain in the body and will not be removed unless they cause problems.

Posterior Approach

In some cases, an operation to stabilize the fractured vertebra can be performed through an incision in the back. This type of procedure can allow the surgeon to use metal screws and metal rods to hold the vertebrae in the correct alignment while the fractured vertebrae heals. The posterior approach is more useful when there is not a great deal of pressure on the spinal cord and the surgeon is trying to prevent the fractured vertebra from collapsing more.

For more information on this type of surgery, you may wish to review the document, entitled:

- Instrumented Lumbar Spine Fusion

Spinal surgery is obviously a serious undertaking. Because of the risks and complications associated with spinal surgery, internal fixation is only done in serious cases.
Complications

With any surgery, there is a risk of complications. When surgery is done near the spine and spinal cord these complications (if they occur) can be very serious. Complications could involve subsequent pain and impairment and the need for additional surgery. You should discuss the complications associated with surgery with your doctor before surgery. The list of complications provided here is not intended to be a complete list of complications and is not a substitute for discussing the risks of surgery with your doctor. Only your doctor can evaluate your condition and inform you of the risks of any medical treatment he or she may recommend.

Please review the document entitled:

- Complications of Spine Surgery

Several specific complications can occur with a vertebral compression fracture. If you notice or suspect a complication, please contact your doctor immediately.

Segmental Instability

If a fracture leads to a vertebral body collapse of more than 50 percent, there is a risk of segmental instability. Each spinal segment is like a well-tuned part of a machine. All of the parts should work together to allow weight-bearing, movement, and support. A spinal segment is composed of two vertebrae attached together by ligaments, with a soft disc separating them. The facet joints fit between the two vertebrae, allowing for movement, and the foramen between the vertebrae allow space for the nerve roots to travel freely from the spinal cord to the body. When all the parts are functioning properly, all spinal segments join to make up a remarkably strong structure called the spine. When one segment deteriorates, or collapses, to the point of instability, it can lead to localized pain and difficulties. The instability eventually results in faster degeneration of the spine in this area.

Kyphotic Deformity

Though the thoracic spine is supposed to be curved (or kyphotic), if the curve in a person's thoracic spine is more than 40 to 45 degrees, it is considered abnormal. Sometimes this deformity is described as "round back posture" or "hunchback". It is a common disorder in elderly women who have osteoporosis and frequent fractures. The front of the vertebrae will collapse and wedge due to the lack of normal vertebral space. This condition leads to a more rounded thoracic spine.

Neurologic Complications

If the fracture causes part of the vertebral body to place pressure on the spinal cord, the nerves can be affected. There is some space between the spinal cord and the edges of the spinal canal. However, this space can be reduced if the pieces of the broken vertebral body push into the spinal canal. The bony tube of the spinal canal cannot expand if the spinal cord or nerves require
more space. If anything begins to narrow the spinal canal - such as if the vertebrae protrude into its space, the risk of irritation and serious injury of the spinal cord or nerves increases.

The narrowing of the spinal canal due to a compression fracture can either lead to immediate injury to the nerves of the spine, or irritation of the nerves later. If the irritation on the spinal nerves comes later (even after the fracture has healed), it can cause pain and problems with the nerves not working right. The lack of space can also cause the supply of blood and oxygen to the spinal cord to be reduced. When the spine needs more blood flow during increased activity, the blood vessels may not be able to swell to get more blood to the spine. This can lead to numbness and pain in the nerves that are affected. The nerves also lose some of their mobility when the space available to them is reduced. This leads to irritation and inflammation of the nerves. This condition is called spinal stenosis. For more information on spinal stenosis, you may wish to review the document, entitled:

- Lumbar Spinal Stenosis

All of these conditions may lead to the need for surgery in order to reduce pressure on the spinal cord, or to stabilize the spine. Surgery might also be necessary to reduce pain and/or the danger of neurological problems.

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