Scheuermann's Kyphosis

A Patient's Guide to Scheuermann's Kyphosis

Introduction

Kyphosis refers to the natural curve of the thoracic spine, which normally has a forward curve of 20 to 40 degrees. In fact the thoracic spine's curve is called kyphotic because of its shape, which is a regular "C" curve with the opening of the C in the front. The thoracic spine is made up of the middle 12 vertebrae of your spine. These vertebrae connect to your ribs and form part of the back wall of your thorax (the ribcage area between the neck and the diaphragm).

Though the thoracic spine is supposed to be curved, if the curve in a person's thoracic spine is more than 40 to 45 degrees, it is considered abnormal or a spinal deformity. Sometimes this deformity is described as "round back posture" or "hunchback". There are many causes of excessive kyphosis, including problems with posture, such as slouching. Problems that are more serious include: healed vertebrae fractures, rheumatoid arthritis, osteoporosis, or Scheuermann's kyphosis.

Scheuermann's kyphosis is a "developmental" type of kyphosis, meaning that it occurs during growth. Wedging of the vertebrae causes this condition. The vertebrae are normally rectangular-shaped and stacked on top of one another like building blocks with a soft cushion in between each one. If they wedge closer together in a triangular shape, as with Scheuermann's kyphosis, it causes the spine to curve more than normal. This disease develops in adolescents while the bones are still growing. Males are twice as likely to develop this type of kyphosis than females.

This document will offer you information about the following:

- Anatomy of Scheuermann's kyphosis
- Causes of Scheuermann's kyphosis
Anatomy

The normal spine has an "S"-like curve if you look at it from the side. This shape allows for an even distribution of weight. The "S" curve helps a healthy spine withstand all kinds of stress. The cervical spine curves slightly inward, the thoracic curves outward, and the lumbar curves inward. Even though the lower portion of your spine holds most of the body's weight, each segment relies upon the strength of the others to function properly.

As described above, the normal thoracic spine can has a curvature, or kyphosis, of between 20 to 40 degrees. A greater (or lesser) degree of curve is considered a spinal deformity. When the thoracic portion of the spine curves 45 degrees or more, it is considered a problematic type of thoracic kyphosis. With Scheuermann's kyphosis, the thoracic curve is usually 45 and 75 degrees. There will also be vertebral wedging of greater than five degrees of three or more vertebrae that are next to each other. The vertebrae in these cases have a triangular appearance, so they wedge together and cut down the normal space between vertebrae.

With Scheuermann's disease, there are sometimes additional abnormalities of the affected vertebrae. These abnormalities are called "Schmorl's nodes". These nodes are areas where the disc (cushion) between each vertebra pushes through the bone at the bottom and the top of the vertebra. This area of the vertebra is called the vertebra's endplate.

Many spine specialists have noticed that in patients with Scheuermann's kyphosis, the ligament that runs along the front of the spine is thickened. Ligaments are the structures that connect bones to bones together, including vertebrae. This ligament is called the anterior longitudinal ligament. Some spine specialists believe that the tightness of this ligament may help cause the spinal deformity. The thickened ligament may affect the growth of the vertebra during childhood leading to too much growth on the back of the vertebra and too little in the front. The imbalance of growth between the front and the back results in a wedged vertebra.
Causes

The cause of Scheuermann's kyphosis has not been discovered, but there are many possible theories about its development. Scheuermann, the Danish radiologist for whom the disease is named, was the first to notice the problem. He proposed that the problem was a result of a process of "avascular necrosis" of the cartilage ring of the vertebral body. This means the cartilage of the spinal bone's ring died because it lacked the necessary blood supply. Scheuermann believed that this interrupted bone growth during development, leading to wedge-shaped vertebrae.

Most researchers think that some sort of damage to the growth area of the vertebrae starts the process. The abnormal growth that follows is what causes the excessive kyphosis. For instance, there may be a vertebral disorder during the rapid growth spurts of adolescence, which then leads to abnormal bone growth. Many spine specialists also suspect that problems with the mechanics of the spine (the way it is put together and functions) play a part in Scheuermann's kyphosis. Muscle abnormalities have been considered as a possible cause. There also seems to be a high genetic predisposition to this disease, which means that it runs in families.

Originally, Scheuermann noticed this spinal deformity in agriculture workers who were frequently hunched or bent over. This of course led to the question of whether poor posture could lead to excessive kyphosis. While this is a logical question, the connection between posture and this deformity has never been confirmed. However, poor posture has been shown to play a role in the making the problem worse. Therefore, correcting postural problems can help improve the abnormal kyphosis.

Symptoms

Symptoms of Scheuermann's kyphosis generally develop in the early teens - around puberty, which occurs between the ages of 10 and 15. When the problem actually begins is hard to determine because X-rays will not show the changes until the patient is around 10 or 11. The disease is often discovered when parents notice the onset of poor posture, or slouching, in their
child. Alternatively, the adolescent might experience fatigue and some pain in the mid-back. The pain is rarely disabling or severe at this point, unless the deformity is severe.

The onset of excessive kyphosis is generally slow. The progressive appearance of kyphosis (round back or hunchback) is what leads many patients to seek medical help. People are more likely to visit a physician as the curvature becomes increasingly noticeable.

With Scheuermann's disease, there is generally a rigid deformity or curvature. It worsens with flexion (bending over), and partially corrects with extension (standing up straight). Pain typically increases with time and length of the deformity. In some cases, a patient with Scheuermann's kyphosis also has scoliosis. Scoliosis is another type of spinal deformity that usually occurs in teenagers. In scoliosis, the curve of the spine curves from side to side. On X-rays taken front-to-back, the spine with scoliosis looks more like an "S" or "C" than a straight line. It is estimated that about one third of people with Scheuermann's kyphosis also have scoliosis.

For more information on scoliosis, you may wish to review the document, entitled:

- Adolescent Idiopathic Scoliosis

About five percent of the population suffers from Scheuermann's kyphosis. Those who have it generally are neurologically normal, which means they do not have any nerves in the spine that have been damaged by the deformity. However, the disorder can cause decreased lung and cardiac functions. The curve of the spine causes the chest to have less room inside the chest cavity. If the deformity is severe, the chest cannot expand fully when you breathe. Eventually, the heart can be affected by the poor lung function.

**History**

When you visit the doctor, you will initially be asked for a complete physical history of your condition. This may begin by filling out a written form asking a number of questions relating to your problem. The more information you share with your health care provider, the easier your spinal problem will be to diagnose.

The history of the problem is important because it helps your doctor understand when the progression of kyphosis or pain began. The doctor will questions about: anything that could have caused an injury, your activity level and lifestyle, physical factors that might be causing the kyphosis, 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.

**Physical Examination**

After taking your history, the physician will give you a physical examination. This helps the doctor to rule out possible causes of kyphosis besides Scheuermann's kyphosis, and to try to determine what is causing your spinal deformity.
An X-ray of the complete spine will probably be taken. The excessive kyphosis will show up on the X-ray and can be measured in degrees. If the problem is simply due to postural problems, nothing else abnormal will show up on the X-ray. But if the kyphosis is due to Scheuermann's disease, the X-ray will show three or more adjacent vertebra that are wedged together at least five degrees each. In addition, the X-ray will show if there are Schmorl's nodes (the small herniations of disc in the endplates of the vertebrae).

Later in age, arthritic changes may appear on the X-rays of people with excessive kyphosis. The changes generally coincide with an increase in pain.

Treatment

Treatment of Scheuermann's kyphosis is somewhat controversial. It depends on many things such as: the patient's age, whether the patient is male or female, the severity of the curve, and the flexibility of the curve.

Non-Operative Treatment

If possible, the deformity will be treated without surgery. One option is casting, or bracing. The goal of bracing is to try to "guide" the growth of the vertebrae in order to straighten the spine. The brace will only successfully straighten the spine in patients who are still growing. The brace is designed to hold the spine in a straighter, upright posture. This is thought to work by taking pressure off the front half of the vertebra, allowing the growth of the bone in the front to catch up with the growth in the back of the vertebra.

A brace may be used in older patients to support the spine and relieve pain, but it will not actually change the curve in these patients.

Though many braces are available, the Milwaukee brace is the most common treatment. The brace will include lateral pads to keep the shoulders pulled back and a chin extension. The brace is usually effective in adolescents with curves of less than 75 degrees (measured on X-rays).

If young patients are consistent in wearing the brace, there is often correction of the deformity within two years. The brace allows remodeling and corrected growth of the developing spine.

Typically, the brace is worn from 16 hours to around the clock for a year, then at nights for two years. Physical therapy might also be recommended to strengthen the back and improve posture, but it is rarely a benefit to patients with Scheuermann's kyphosis.

Operative Treatment

Surgery is usually only effective if the kyphosis exceeds 75 degrees when measured on X-rays. Anything less than 75 degrees is usually treated with just the Milwaukee brace. Occasionally surgery is done for cosmesis (cosmetic reasons), but because the surgery is serious and involves the spine, it generally is not recommended just to improve appearance.
Surgery for the correction of Scheuermann's kyphosis typically consists of a fusion of the abnormal vertebrae. The operation has two parts - one operation is done on the front of the spine and another on the back of the spine. A posterior-only fusion is rare because of the rigidity of the curves. In the operation, the spine is fused anteriorly and posteriorly with surgical implants.

It is a serious operation, and though the results can be very satisfying, the risk factors should be carefully considered.

**Possible Complications from Surgery**

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.

To learn more about the complications of spine surgery, you may wish to review the document, entitled:

- *Complications of Spine Surgery*