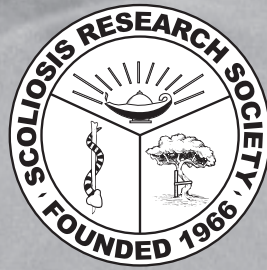
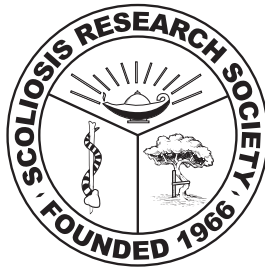


Spinal Deformity: Kyphosis

A Handbook for Patients





Scoliosis Research Society

Dedicated to Education, Research and Treatment of Spinal Deformity

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Preface



The Scoliosis Research Society has prepared this booklet to provide patients, and in the case of children, their parents, with a better understanding of kyphosis and its diagnosis and management. This information is intended as a supplement to the information your physician will provide you. Just as no two individuals are exactly alike, no two patients with a spinal deformity are the same. Therefore, your spinal deformity surgeon should be the most important source of information about the management of your particular spinal problem.

It is not intended that the contents of this manual be interpreted as standards or guidelines proposed by the Scoliosis Research Society.

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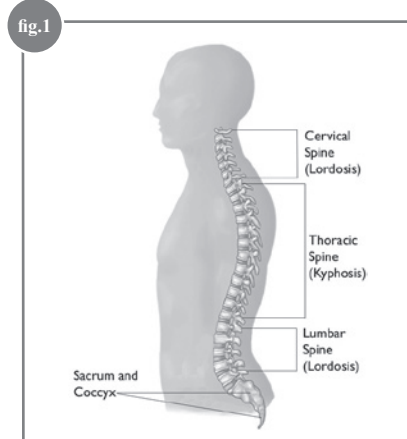


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What is Kyphosis?



A normal spine has a straight appearance when viewed from the front or back, and several gentle curves when viewed from the side. The chest area has a normal rounding called thoracic kyphosis, while in the lower spine there is an opposite curve called lumbar lordosis. The two opposite curves of the spine provide symmetry and trunk balance allowing an upright posture. (Figure 1)



The thoracic spine usually consists of twelve vertebrae, each with two ribs. The normal roundness of the thoracic spine can be measured on an X-ray and usually ranges from 10° to 45°. Increased rounding in the chest area with a curve measuring more than 45° is called hyperkyphosis.

Figure 1

When viewed from the side, a normal spine has three normal curves.

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Postural Kyphosis



In postural kyphosis, the increased roundness of the back is caused by slouched posture and can be corrected when the patient stands up straight. People commonly refer to postural kyphosis simply as “poor posture”. Typically, it is not painful and the bony structure of the vertebrae are normal when seen on X-rays. (Figure 2) Postural kyphosis is natural for some people, and typically cannot be permanently corrected, though exercises for the back muscles and mindfulness may help people sit and stand with a straighter spine.

Structural Kyphosis



Structural kyphosis means that the vertebrae have an abnormal shape. Structural kyphosis can occur with or without other deformities like scoliosis (a curvature seen from the front or back, rather than from the side). Structural kyphosis can result from vertebral malformations that develop before birth known as congenital kyphosis, or can develop from abnormal growth of the vertebrae, most commonly called Scheuermann’s kyphosis. (Figure 3) Less common causes for structural kyphosis include infections of the spine, tumors in the vertebrae, changes following other spine surgeries, and fractures related to accidents or weakened bones from osteoporosis.

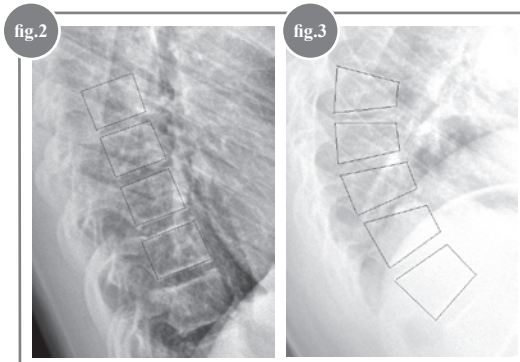


Figure 2:

Close-up X-ray of a patient with postural kyphosis. Note that the vertebrae are shaped like rectangles.

Figure 3:

Close-up X-ray of a patient with structural Scheuermann’s kyphosis, as seen from the side. Note the wedged shape of each vertebra.

What Are the Signs of Kyphosis?



1. There is increased roundness of the upper back (thoracic spine) giving a “hunchback” appearance.
2. The head may be positioned in front of the hips when viewed from the side.

What Should Be Done?



It is important to recognize that increased kyphosis can occur in children or adults. Treatment options vary depending on the age of the patient as well as the cause of kyphosis.

Although surgery is occasionally needed to treat some types of kyphosis, nonoperative management is far more common.

Non-Operative Management

Observation

Observation is typically recommended for postural kyphosis, smaller amounts of structural kyphosis in patients that are still growing, and even larger amounts of kyphosis in patients that have completed their growth. Patients will return to see their surgeon periodically for an examination and X-rays to make sure the kyphosis is not worsening. Children may require X-rays every 6-12 months while they are growing, but adults can typically monitor their kyphosis less frequently.

Exercise

Exercise programs are frequently recommended for patients with kyphosis, with or without pain. Exercises for kyphosis focus on strengthening the muscles that support the spine (core muscles). The muscles between the shoulder blades are especially important. If patients are experiencing pain, having stronger muscles can help improve it in all types of kyphosis. Your surgeon may recommend a home program of exercise, or direct you to a physical therapist who specializes in teaching postural and core muscle exercises.

Bracing

In the structural form of kyphosis called Scheuermann’s kyphosis, brace treatment may be recommended. (Figure 4) The subset of patients who will benefit from brace wear typically includes patients who are still growing, have moderate-sized kyphosis, have a body type that will tolerate brace wear, and who are willing to be compliant with brace use. Protocols for kyphosis bracing, including what type of brace to use, how many hours per day to wear the brace, and how many months or years of wear will be required, are

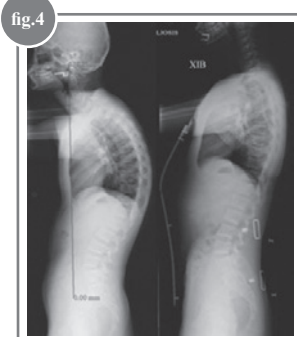


Figure 4:

(Left) Side-view of a patient with Scheuermann’s kyphosis.

(Right) The same X-ray after patient was placed in a hyperextension brace.





variable and will be determined by your surgeon. Braces must be regularly evaluated and adjusted to ensure proper fit. Permanent correction of kyphosis from brace use is unusual, but the goal is for bracing to slow or stop progression, improve pain and help avoid surgery. Using braces can be challenging for many patients and a thorough discussion with your surgeon is needed prior to initiating brace treatment to determine if it is a good choice for you.

Bracing may be beneficial in other types of structural kyphosis, especially kyphosis from fractures or osteoporosis. However, there is little role for bracing in congenital kyphosis, when patients are born with abnormally-shaped vertebrae, or in postural kyphosis.

Surgical Treatment

Spinal Fusion

Surgical treatment may be recommended for some cases of kyphosis, especially if the curve is large, is worsening, or is associated with back pain. Surgery can provide significant correction without the need for postoperative bracing. Correcting the shape of the back is the main benefit of the operation, but pain relief following surgery is less certain. Still, many patients experience less pain following their recovery from surgery. During the surgery, the vertebrae that cause the deformity are joined together in a corrected position. Metal implants such as pedicle screws, hooks, or cables are attached to the spine, and are then connected with two strong rods. These metal implants provide stability for the vertebrae as bone grows between the vertebrae (called a fusion) in the months following surgery. (Figure 5)

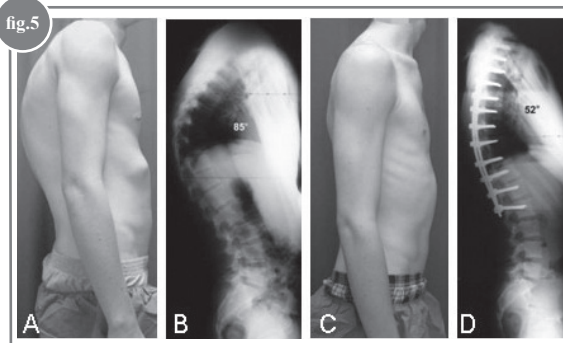


Figure 5:

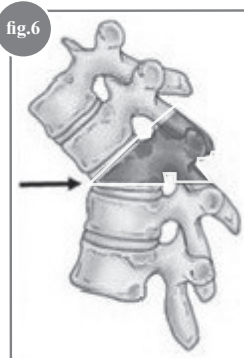
Figure 5A: Preoperative photo of patient with severe kyphosis.

Figure 5B: Preoperative X-ray of the same patient.

Figure 5C: Postoperative photo of the same patient one year after surgical correction of the kyphosis.

Figure 5D: Postoperative X-ray of the same patient.

Most surgeries are performed through a back incision. However, in severe cases, some physicians may recommend additional surgery on the front of the spine. Patients are usually able to return to all activities after surgery. Your surgeon will tell you how long your activities might be restricted after surgery.



Spine osteotomies are commonly required during kyphosis surgery (Figure 6). This means that parts of the vertebra bones will be removed to allow the surgeon to move the spine into a corrected position.

Figure 6:

The outlined area shows the bone removed in a pedicle subtraction osteotomy.





The goal of surgery is to fuse the spine in a corrected position, while keeping the nerves and spinal cord safe. There are always risks that accompany any surgical procedure. These should be discussed with your surgeon. Some important points when considering surgery are:

1. A comprehensive preoperative discussion with your treating physicians
2. Good nutritional status before and after surgery
3. Exercise program before and after surgery
4. Positive mental attitude

Frequently Asked Questions about Kyphosis



1. *Do nutritional factors cause kyphosis?*

In young, healthy people, what you eat does not appear to cause kyphosis. If you are older, osteoporosis or weak bones can result from not having enough calcium in the bones and can cause kyphosis. It is helpful to discuss with your physician how to keep bones strong as you get older.

2. *Does poor posture cause structural kyphosis?*

The exact cause of Scheuermann's kyphosis is unknown, but there is no evidence that it is caused by poor posture. Poor posture does not cause kyphosis or change the bones of the spine permanently.

3. *Can carrying a heavy book bag cause kyphosis?*

Heavy back packs and loads on the back do not cause permanent changes in the bones of the spine or kyphosis. Although carrying heavy things can certainly contribute to sore back muscles, it does not change the shape of the spine.

4. *Does kyphosis cause back pain?*

The back muscles in a person with kyphosis have to work harder during sitting and standing and can become painful as they get tired. The bones themselves are not a cause of the pain. Increased kyphosis does not make you more likely to get arthritis in the spine as you get older.

5. *Do braces make the spine straight?*

Braces can keep kyphosis from getting worse or can provide support for a painful back. However, they do not make kyphosis better or cause permanent changes in the bones of the spine.

6. *Does smoking cause kyphosis?*

Smoking does not cause kyphosis. Smoking does make spine surgery less safe for the patient and can actually prevent bone and soft tissue healing after surgery.

7. *Do metal implants (like spinal instrumentation) activate the metal detectors at airports?*

Most spine implants do not activate metal detectors and implants generally do not prevent patients from traveling. In the United States, doctor notes are not required for spine implants as they are not accepted by the Transportation Safety Administration (TSA).

8. *Do metal implants rust, or are they subject to rejection by the body?*

Modern metal spine implants do not rust and usually do not need to be replaced, unless the patient has a complication from surgery. Some patients can have metal allergies where the body reacts to the type of metal. If a person has a specific metal allergy, different metals can be used during surgery.





9. *Does spine surgery interfere with normal childbearing?*

Spine surgery generally does not interfere with childbearing, unless the surgery includes the pelvis. In that case, the effect of the surgery on pregnancy can be discussed with your surgeon. Spine surgery can prevent routine use of an “epidural”, a pain medication given directly to the spine during the birthing process. The anesthesia doctor giving the epidural will ask if you have had previous spine surgery before offering this option.

10. *Is kyphosis contagious?*

Kyphosis is not contagious and cannot be passed from person to person like the common cold. Some kyphosis can be genetic and run in families. However, we do not understand the genetics well enough to know who in the family will get a spinal deformity.

11. *Can kyphosis be prevented?*

Currently, there are no known ways to prevent kyphosis from developing.

Summary



Kyphosis is an increased rounding of the back, usually noticed in the thoracic spine, between the shoulder blades. Kyphosis can be structural or postural. Treatments for kyphosis may include observation, bracing, exercises, or surgery. If kyphosis is suspected, your physician will usually take X-rays to help diagnose or rule out the condition. If kyphosis is confirmed, your physician can help you decide the best treatment, based on the type of kyphosis, the degree of kyphosis, your age and remaining growth, and any other associated symptoms.

Where Can I Get More Information?



The best information about your specific condition typically comes directly from your surgeon. You can check to see if your surgeon is a member of the Scoliosis Research Society by going to <http://www.srs.org/find/>. Membership in SRS indicates that at least 20% of the doctor’s practice is in spinal deformity, that they attend annual meetings, and stay abreast of new information and new research.

In addition to the Scoliosis Research Society website (www.srs.org), there are other reputable organizations that may offer information about Kyphosis.

Here is a list of some patient resource websites that may be of assistance:

- www.srs.org – Scoliosis Research Society
- www.posna.org - Pediatric Orthopaedic Society of North America
- www.aaos.org – American Academy of Orthopaedic Surgeons
- www.nih.gov/niams/healthinfo - National Institute of Arthritis and Musculoskeletal and Skin Diseases
- <http://etext.srs.org/> - SRS provides information through the E-Text as an educational service. E-Text material is not intended to represent the only, nor necessarily best, methods or procedures appropriate for the medical situations discussed, but rather is intended to present an approach, view, statement or opinion of the chapter author(s) that may be helpful to others who face similar situations. SRS disclaims liability for all claims that may arise out of the use of techniques demonstrated therein by such individuals

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Please consider a donation to SRS.

100 percent of all contributions and donations to the Scoliosis Research Society's (SRS) Research, Education Outreach (REO) Fund are used entirely for research, outreach programs, and educational scholarships and fellowships seeking improved treatments, the causes and possible prevention of spinal deformities. Operating funds for SRS come from membership dues, educational meetings and courses, publication sales and other sources.

With your support, SRS can continue to support and offer necessary educational opportunities, beneficial research grants and maintain effective advocacy efforts that will change the lives of those living with spinal deformities.

If you would like to make a donation to the Scoliosis Research Society, please fill out the form below and mail it to:

Scoliosis Research Society
555 East Wells Street, Suite 1100
Milwaukee, WI 53202-3823 USA

Please make checks payable to Scoliosis Research Society.

If you would like to make your donation online, please go to www.srs.org/support/donate_now.htm

YES! I would like to donate to the Scoliosis Research Society (SRS) to help continue in fulfilling its mission to improve the lives of patients with spinal deformities!

Enclosed is my gift of: \$10, \$20, \$35, \$50, \$100, \$150, Other _____

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PRESIDENTS ELITE	\$40,000-\$99,999	\$20,000-\$49,999
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LEGENDS	\$500,000-\$999,999	\$250,000-\$499,999
LEGENDS ELITE	\$1 Million or more	\$500,000 or more

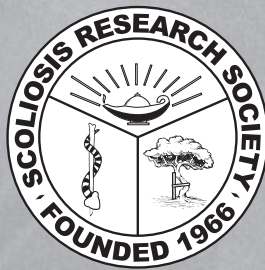
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