

Scoliosis and Spinal Deformities

A guide for patients

Division of Spinal Surgery
Department of Orthopedic Surgery

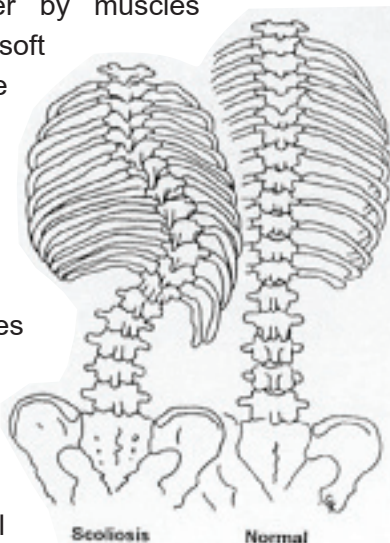


If you or a member of your family has a spinal deformity you probably have questions and concerns. The Spinal Program team within the Department of Orthopedic Surgery at Children's Hospital Boston have prepared this booklet to help answer your questions. In it we describe spinal deformities and explain both non-operative and surgical treatment.

Your orthopedic team is ready to answer your questions and to help you understand your particular spinal abnormality and treatment. This booklet is not meant to substitute for discussions with the spinal team. No question is too simple to ask. Please write down any additional questions you have and bring them when you come for your next appointment. We welcome your questions.

What is the spine?

The spine is made up of many individual bones called vertebrae, joined together by muscles and ligaments. Flat, soft intervertebral discs separate and cushion each vertebra from the next. Because the vertebrae are separate, the spine is flexible and can bend. Together the vertebrae, discs, muscles and ligaments make up the vertebral column or spine. Different regions of the spine are named differently. The cervical spine refers to the neck, the thoracic spine to the chest, and the lumbar and sacral spines to the lower back.



What are normal spinal curves?

Just as the shapes of peoples' bodies differ, the normal spine varies in size and shape. You may have been told to "stand up straight," but no one's spine is perfectly straight. The healthy spine has front-to-back curves. It's only when these curves become too large that they present a potential problem.

When the backward curve in the upper spine is too great, the condition is called thoracic hyper-kyphosis, round back, Scheurmann's disease, or sometimes simply kyphosis. When there is not enough backward curve in the upper spine, the condition is called hypo-kyphosis. When the inward curve in the lower back is too great, the condition is called hyper-lordosis or swayback.

What is scoliosis?

Although the spine does curve from front to back it should not curve sideways very much. A side-to-side curve is called scoliosis and may take the shape of an "S" (double curve) or a long "C" (single curve).

Scoliosis is more than just a curve to the side. The scoliotic spine is also rotated or twisted, like the stripes on a barber pole. As the spine twists it pulls the ribs along with it, so that one side of the chest becomes higher than the other, or the shape of the breastbone may change. You may have noticed that one of your shoulders is higher than the other or that your clothes hang unevenly at the waist because one hip is higher than the other. To better understand this, compare the drawings of the normal spine and scoliotic spine. Many people with scoliosis also have hypo-kyphosis. Because of all the possible combinations of curvatures, scoliosis can be very different in different people.

What causes abnormal spinal curves?

There are many different causes of abnormal spinal curves. Some babies are born with spinal defects that cause the spine to grow unevenly, a condition called congenital scoliosis or congenital kyphosis. Some children have nerve or muscle diseases, injuries or other illnesses that cause spinal deformities, for example cerebral palsy, or myelomeningocele.

Sometimes, however, the back just doesn't grow as straight as it should, and no one knows why. This most common type of scoliosis is called "idiopathic" scoliosis and has no known cause. There is no known prevention. This means that if you have scoliosis, nothing you did caused it, and you could have done nothing to prevent it.

Scientists are studying idiopathic scoliosis, hoping to discover its cause. They have many clues but no real answers yet. They do know it tends to run in families and that girls are eight times more likely to have it than boys. Scoliosis isn't rare, it affects about one in every ten people. Many people have mild scoliosis but are unaware of it and need no treatment for it.

Observation: keeping watch on curves

Idiopathic scoliosis doesn't happen all at once, it develops gradually over time, and may worsen rapidly during rapid growth in the pre-teen and teen years. Some mild curves never worsen with growth and need no treatment. Some curves worsen only a little and need no treatment. Early detection of abnormal spinal curves by school screening programs and pediatricians is intended to find scoliosis early enough to begin brace treatment and avoid surgery. Once an abnormal spine curve has been detected, it is important to monitor the curve during growth.

The years before and during adolescence are a time of rapid growth and your curve can worsen quickly. Your doctor will decide on your treatment plan and follow-up based upon your x-rays and physical exam. Even though your curve may not bother you now, it needs to be watched all through your growth. Your doctor will show you the curve on your x-rays to help you understand how the degree of curvature is measured.

Why treat scoliosis? avoiding future problems:

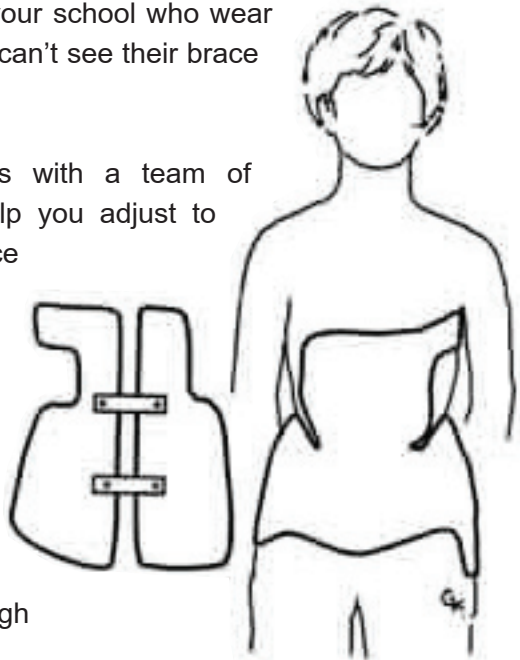
Scoliosis rarely seems a problem to the child or adolescent who has a curve. Why then do we bother to monitor and treat curves? Adults with moderate or severe scoliosis can have progressively worsening curves which cause cosmetic disfigurement, back pain and in worse cases, difficulty breathing. Treatment after the curve has already become severe in adulthood is much less successful than treatment during childhood or adolescence. By finding progressive curves early, we hope to keep them from becoming problems in adulthood.

Treatment without surgery: exercises and braces

The treatment of scoliosis depends on the location and degree (severity) of curvature. Slight curves (curves measuring less than 20 degrees), usually requires no treatment, but must be watched carefully for worsening during growth. If your curve shows significant worsening or is already greater than 30 degrees, and you are still growing, your doctor will probably recommend a bracing program.

The scoliosis brace is designed especially for you and your particular curve. It holds your spine in a straighter position while you are growing to try to partly correct your curve or prevent it from increasing. A bracing program may help you avoid surgery. You will need to wear your brace almost all the time until the end of growth. Almost all braces can be hidden beneath normal clothing, and you can continue to do all athletic activities. Usually there are other adolescents in your school who wear braces, but since you can't see their brace you don't know it!

Your physician works with a team of professionals who help you adjust to this treatment since a bracing program can be difficult and you may need help in organizing your activities and school day. The team offers both support and experience in guiding you through



the process. The team includes your doctor, orthotist (a specialist who makes braces), a physical therapist, and a nurse. Your doctor and the orthotist decide which brace design is right for you. The braces are made of firm plastic and fit closely over the hips, and worn under the clothes. A few have metal pieces extending to the chin, but these are usually only necessary to treat hyperkyphosis and are usually only worn part time.

The physical therapist evaluates your posture, muscle strength and flexibility and gives you a home exercise program which is designed specifically for you. This program helps to stretch and strengthen your muscles so that you are more comfortable in your brace. Each time you visit the clinic, you will see the physical therapist.

The nurse will help you and your parents with all of your questions and your appointments. The nurse will also teach you how to care for yourself and your brace, give you a schedule to follow, and helps plan your day-to-day activities. If you are interested your nurse can also help you meet others who wear braces. Following a brace program may sound like a lot of work and effort, but if your curve can be controlled with a brace and you can avoid surgery, it will be worth it!

Surgery:

Some curves do not respond to bracing despite everyone's best efforts, and some curves are just too large to begin with (greater than 40-45 degrees). If you have this type of curve, you will probably need surgery. If your doctor recommends surgery, you'll want to think about it seriously and ask many questions.

The goal of the surgery is usually a solid fusion (solidification) of the curved part of the spine. A fusion is achieved by operating on the spine, adding bone chips and allowing the vertebral bones and bone chips to slowly heal together to form a solid mass of bone called a fusion. The bone chips (bone graft) may come from your hip (iliac crest) or from the hospital's bone bank. Often the spine is partially straightened with metal rods and hooks or wires (instrumentation). The rods or sometimes a brace or cast hold the spine in place until your fusion has a chance to heal. Once the fusion has healed (usually 3 to 12 months) the abnormal section of the spine cannot curve more. The rods, hooks or wires can usually be left in your back without causing any problems.

Posterior Fusion

Posterior fusion with instrumentation is the most common operation done for idiopathic scoliosis. In the posterior fusion the spine is operated on from behind with an incision straight down the back. Various types of rods, hooks, wires or screws are used to partially straighten the spine and hold it fast while the bone fusion occurs. Operations are often named after the surgeons who designed the instruments such as Harrington, Luque, Cotrel-Debousset (C-D), TSRH, and Drummond. For most of these operations on idiopathic scoliosis, no brace or cast is used postoperatively. In congenital scoliosis or spondylolisthesis the posterior fusion is usually done without instrumentation, and a cast or brace

is needed postoperatively.

Anterior Fusion:

Anterior fusion is used in some special instances of idiopathic scoliosis, and commonly in congenital scoliosis, kyphosis, or myelomeningocele. An incision is made along a rib and/or down the front of the abdomen to obtain access to the front of the spine. Bone graft from hip, rib or bone bank is used for the fusion. Screws and washers attached to a rod may be used to straighten the spine. Fusions of this type are called Zielke or TSRH anterior fusions and usually require a postoperative brace.

Anterior and Posterior Fusion:

Some special cases of spinal deformity require both an anterior (front) and posterior (back) operation. Usually these can be done on the same day, but sometimes must be done at separate operations spaced 1-2 weeks apart.

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