

Understanding Scoliosis

The most common form of spinal deformity in young people is known as scoliosis, which is a term derived from the Greek word for curvature. Scoliosis presents with a wide spectrum of severity including a mild, almost imperceptible curve and extending to severely deforming curves that can limit function later in life. Children with scoliosis typically present with a noticeable curve during the period of rapid growth during the early adolescent years. Either a parent, physician, or school nurse will often note a curve in the back or possibly the appearance that the child is not standing full straight. Scoliosis, which presents in the pre-teen years, is technically termed Adolescent Idiopathic Scoliosis. The term idiopathic refers to this most common form of scoliosis and indicates that the origin or etiology is essentially unknown.

Scoliosis represents a curve in either the upper back, commonly known as the thoracic spine, or the lower back, known as the lumbar spine. When observed from the back, the curve will typically have either a backwards "C" or "S" shape. The presence of a curve can be confirmed by x-ray and the angle of the curve can be measured to monitor its progression. The diagnosis of scoliosis is not made unless a curve measures at least 10 degrees, since it is common for a sizeable proportion of the general population to have a minor but measurable curve of up to 10 degrees. The prevalence of scoliosis in the general population is 25 per 1000 people. The frequency of scoliosis is equal among boys and girls, although girls are significantly more likely to have larger curves.

The progression of a curve is dependent on a number of factors. Generally, curves that present at a younger age and curves that are larger tend to progress more rapidly. Children who present with a small curve at an older age tend to have less progression of the curve. Scoliosis progresses most rapidly during the years of active growth, with the rate of progression of a curve much diminished once a child begins menstruation or approaches physical maturity.

Scoliosis is partially inherited even if neither parent shows any evidence of a curve. This is known as familial inheritance. There are a number of causative factors associated with scoliosis, which is presently thought to result from an underlying neuromuscular abnormality.

Adolescent Idiopathic Scoliosis is diagnosed in children 10 years of age or older. Infantile curves occur between 0-3 years of age, and Juvenile curves appear in children 4-10 years old. These younger ages of presentation tend to represent a much more aggressive curve than the typical adolescent curve. Other types of curves include Congenital scoliosis and Neuromuscular scoliosis. A Congenital curve occurs as a result of structural abnormalities of the vertebral bodies that make up the spine. These abnormalities are present at birth and can result in aggressive, progressive deformity as a result of asymmetric growth of the spinal column. Neuromuscular curves occur frequently with the diagnosis of neuromuscular diseases such as cerebral palsy, myelomeningocele, and muscular dystrophy.

When the presence of a curve is suspected in a child, a complete clinical evaluation should be undertaken by a spine specialist. This includes a thorough birth and developmental medical history, as well as a physical examination with baseline x-rays. A child with scoliosis is followed at regular intervals to monitor any progression of the curve. Evidence of physical maturity, such as the onset of menstruation and breast development in girls, is suggestive that a curve may slow down its rate of progression. Standing x-rays are mandatory to document the degree of curvature. Modern techniques and x-ray film minimize the child's exposure to radiation.

Initial treatment involves the use of a brace once a curve has progressed to a point of greater than 20-25 degrees. An important misconception concerning bracing is that a brace will improve the degree of deformity of a scoliosis curve. The only purpose of bracing is to slow down the rate of progression of a curve and to decrease the

likelihood that the child will ultimately require surgery. Bracing is undertaken for 16-23 hours per day, and is continued until the child reaches skeletal maturity at which time the child can be weaned from the brace. The use of a brace does not guarantee lack of progression of the curve or assure avoidance of surgery. Unfortunately, it is impossible to predict whether a curve will progress as a child develops. This uncertainty makes it mandatory to brace a child that meets certain criteria. A brace should be properly fit by an orthotist who is trained in fitting a scoliosis brace.

Any child with scoliosis should follow an active stretching program to maintain flexibility as well as function. It is a misconception that either exercise or manipulation can correct a curve. The best possible scenario of non-operative care involves slowing down the rate of progression. It is unrealistic to anticipate correction of the curve with any non-operative modality.

If a curve progresses to a measurement of 40+ degrees, then surgery becomes necessary to prevent further progressive deformity. Scoliosis does not typically cause pain, and the active treatment of a curve is undertaken both for cosmetic reasons as well as to prevent further progression. A large curve creates deformity that can result in poor posture, difficulty with balance and functional and degenerative changes over the years.

Scoliosis reconstruction is undertaken to improve the curve from a cosmetic standpoint as well as to prevent further progression of the curve. The purpose of scoliosis surgery is not to fully straighten a curve, but rather to obtain reasonable correction of the curve, and to restore balanced posture for the patient. Spinal instrumentation, consisting of stainless steel or titanium hooks and screws are used to anchor rods across the curve. The curve is corrected through a combination of distraction, compression, translation, and derotation of the curve. Bone chips usually “harvested” from the pelvis are generously sprinkled along the area of instrumentation. The bone chips harden into new bone reinforcing the correction obtained with the instrumentation. Newer strategies and methodologies frequently eliminate the need for postoperative bracing.

Spinal deformity consists of the broad distribution of curvatures of the spine with Adolescent Idiopathic Scoliosis in teenagers representing the single most common category of scoliosis. For those children that exhibit progression of the curve, bracing is the initial choice of treatment. In many cases, this will minimize progression of the curve, although bracing will not correct a curve. For those curves that continue to progress, surgery becomes the treatment of choice to improve the cosmetic deformity as well as both balance and function.