Scoliosis and Kyphosis (Curvature of the Spine)

Scoliosis is a back condition that causes the (back) spine to curve to the side - either left or right. Most cases develop in children between the ages of 9 and 14 years during the growth spurt of puberty. Scoliosis is usually mild and needs no treatment. For more severe cases treatments include specific exercises, a back brace or occasionally surgery to straighten the spine. A very pronounced front-to-back curve is called a kyphosis, which does not usually need treatment.

What is scoliosis?

The word scoliosis comes from the Greek word meaning crooked. The back (spine) should look straight, up and down, when you look at someone from behind. If the spine has a sideways curve, it is called a scoliosis.

The curve can bend to the left or to the right. The severity of the curve can vary from very mild and barely noticeable to severe.

The curve can be in the lower part of the spine (a lumbar curve), in the upper part of the spine (a thoracic curve) or go from the upper to lower part of the spine (a thoracolumbar curve). In some cases there is a double curve - like an S shape.

What is the difference between scoliosis and kyphosis?

If you look at someone from the side, normally there are three slight front-to-back curves in the spine - one in the neck, one in the chest section and one in the lower back. An abnormal, more pronounced front-to-back curve is called a kyphosis. This is different to a scoliosis which isn't noticeable from the side.

What are the causes of kyphosis?

Kyphosis can occur at any age, although it is rare at birth. Adolescent kyphosis, also known as Scheuermann's disease, is caused by the wedging together in a row of several bones (vertebrae) of the back (spine). The cause of Scheuermann's disease is unknown.

In adults, kyphosis can be caused by various conditions affecting the spine, including:

- Arthritis of the spine.
- 'Thinning' of the bones (osteoporosis) of the spine, if it has caused one or more of the bones in the spine to flatten (called a wedge fracture).
- Spina bifida.

The treatment usually depends on the underlying cause. This is covered in the separate leaflets on those specific subjects - follow links in red.

What are the causes of scoliosis?

There are several different types of scoliosis and the causes of each are different:

Non-structural scoliosis (functional or postural scoliosis)
In this type, the back (spine) is structurally normal, but looks curved because of another condition such as having one leg that is significantly longer than the other or muscle spasm in the back muscles. The curve is usually mild and it changes or goes away when the person bends sideways or forwards.

**Structural scoliosis**

In these cases, the curve is fixed and doesn't go away when the person changes position. There are different types:

- **Idiopathic.** This means the cause is not known. For more than 8 out of every 10 people with scoliosis the cause is idiopathic.
- **Neuromuscular.** This means the curve is caused by a condition which affects muscles or nerves of the back. For example, it may happen in some people with muscular dystrophy, polio, cerebral palsy, or neurofibromatosis. Each of these conditions has other symptoms and problems in addition to a scoliosis. In around 1 out of every 10 people with scoliosis it is due to a neuromuscular problem.
- **Osteopathic.** This means as a result of a bone abnormality.
- **Congenital.** This means the spine has not formed properly while the person was a baby developing in the womb. Around 1 in every 10 people with scoliosis have had it since birth.

The rest of this leaflet is about the most common type - idiopathic scoliosis.

**Who develops idiopathic scoliosis?**

Idiopathic scoliosis can develop at any stage in childhood. It is not known how or why it develops. It is not due to poor posture and you cannot prevent it starting.

It most commonly develops during the growth spurt of puberty and early adolescence. This is usually between the ages of 10-12 years for girls and 11-16 years for boys. About 1 in 40 children have some degree of scoliosis. Mild scoliosis affects about the same number of boys and girls. However, moderate or severe scoliosis is more common in girls.

Idiopathic scoliosis is not a straightforward hereditary condition. However, about 1 out of every 4 people affected with scoliosis have one or more other family members with the same condition.

**Idiopathic scoliosis symptoms**

In most cases the onset of the scoliosis is gradual and painless. Scoliosis is usually noticeable on bending down. Sometimes a mild-to-moderate scoliosis can develop without being noticed by the child or their parent/s. This is often because the condition usually develops during adolescence when children often become more self-conscious. Parents and others are less likely then to see a naked back (spine) and see the problem.

Scoliosis can cause mild pain and imbalance of the muscles. If scoliosis becomes more severe then it can become more disfiguring. This is because when the spine curves sideways, as the curve becomes more severe, the small bones (vertebrae) that make up the spine also twist around. This pulls any attached muscles, ligaments and ribs around with them. As a consequence:

- If the scoliosis is in the chest (thoracic) region, the ribs and shoulder blade stick out like a bulge on one side of the back. Also, one shoulder may hang lower than the other and one shoulder blade may be higher than the other.
- If the scoliosis is in the lower back (lumbar) region, it can make the pelvis thrust forward on one side and one leg may appear to be shorter than the other.

If scoliosis is not treated and becomes severe, it can cause problems later in life. For example, persistent back pain may develop and it can affect your general fitness and your overall quality of life. If the deformity is very severe, breathing problems or heart problems may develop - this is fortunately rare.

If a child has back pain it is very unlikely that it is due to scoliosis. For more common causes of children's back pain, see separate leaflet called Back Pain in Children.

**How is idiopathic scoliosis diagnosed?**
Scoliosis is often seen when you bend forward. A bulge on the back (spine) is more obvious when bending forward.

If your doctor diagnoses scoliosis then you will usually be referred to a specialist.

X-ray pictures of the back are sometimes done to assess the angle of the curve. This gives an idea of the severity of the condition and the likelihood of it getting worse. Other investigations - for example, magnetic resonance imaging (MRI) scanning or computerised tomography (CT) scanning of the neck - are needed in some cases.

What is the treatment for idiopathic scoliosis?

The aims of treating scoliosis are:

- To prevent the curve becoming worse.
- To avoid the need for surgery in later life.
- To prevent breathing problems.
- To improve how the spine looks.

People with more severe scoliosis may need treatment to stabilise the back (spine). Many people with scoliosis do not need treatment.

Treatment depends on various factors, such as:

- The person’s age.
- Whether they are female or male - scoliosis in girls tends to worsen more quickly.
- Whether they are still growing.
- The severity of the curve.
- The exact location of the scoliosis - for example, the upper (thoracic) or lower (lumbar) back.
- The chance that scoliosis may progress.

Treatment options include observation, specific physiotherapy exercises, wearing a brace, and surgery. The international Scientific Society on Scoliosis Orthopaedic and Rehabilitation Treatment (SOSORT) recommend that non-surgical treatment should be delivered by a specialist team to include a doctor, physiotherapist, orthotist and possibly also a psychologist.

**Observation**

Most people have mild scoliosis and do not need any treatment. However, a specialist may arrange regular reviews to make sure that the scoliosis is not getting worse as children get older. Once the main bone growth ends after puberty, scoliosis does not usually worsen. Sports and other activities can be done normally - there is some evidence that sport and exercise make people with scoliosis feel better about themselves and that they have fewer emotional problems. Occasionally, a specialist may advise against certain activities such as heavy contact sports or gymnastics.

**Physiotherapy**

Research that shows that specific exercises help to prevent scoliosis worsening has recently been published. The exercises are called physiotherapeutic scoliosis specific exercises (PSSE) and need to be performed from twice a week to daily and occasionally several times a day. This requires a lot of motivation.

**Back braces**

There are several different types of back brace. The more modern ones are more comfortable to wear than the older ones. If the scoliosis is moderate or becoming worse, then a back brace may be advised, either alone or in addition to PSSE. A brace does not cure a scoliosis. The aim of a brace is to prevent the scoliosis from becoming worse as the child grows. A brace is worn most of the day and night. Towards the end of treatment they often only need to be worn at night. Most normal activities can be done whilst wearing a back brace. However, they need to be removed for washing and swimming. Wearing a back brace can be difficult for a young person to stick to. An expert team will involve them in the decision to wear a brace, so that they understand why they are doing it and what they are going to gain from it - if it isn’t worn, it won’t work.
Surgery
An operation is sometimes advised for people with severe scoliosis, although if a brace is worn it should be possible to prevent the need for surgery. The aim of the operation is to correct the curve, to stabilise the spine and also to fuse the curve. Fusion is the joining of two or more back bones (vertebrae). Implants or rods are often used to keep the back straight after the operation. These rods are usually lengthened every 4-6 months as you grow.

There are different surgical techniques used. Your specialist will be able to advise which type of surgery, if any, may be beneficial for you. In general, the operations done for scoliosis are usually very long procedures and involve many months of recovery afterwards. Also, they are not always successful.

Alternative treatments
There is good-quality research that has shown that osteopathy does not work for scoliosis. There is no reliable evidence that other techniques, such as chiropractic, reflexology, acupuncture, neurostimulation, and so on, can make any difference to a scoliosis. However, some people with scoliosis find these complementary techniques to be useful to improve backache or pain.

Further reading & references

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