Postural Screening Program

Connie Poe-Kochert, CNP
Pediatric Orthopaedics
University Hospitals of Cleveland
Rainbow Babies Children's Hospital

Rainbow Babies and Children's Hospital is the primary affiliate of Case Western Reserve University and is the only pediatric hospital in Cleveland, Ohio dedicated solely to the comprehensive care of newborns and other children (including adolescents).

This is a view of one of our patient’s room.

SCOLIOSIS

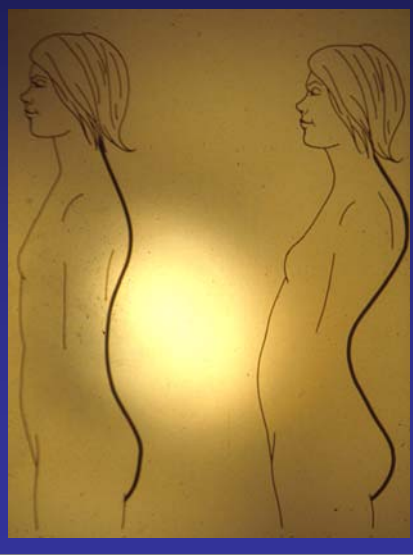
- Side to Side Curvature
- Rotation

Scoliosis is a side to side curvature of the spine accompanied by rotation (or twisting). Anything attached to the spine will also twist such as the ribs and spinal muscles. This rotation is what enables scoliosis to be identified with the forward bend test.

When viewed from the back or front, the normal spine is straight (0 degrees). Scoliosis may involve the upper (cervical), middle (thoracic), or lower (lumbar) areas of the spine, or a combination of the above.

Look for increase kyphosis (round back) also, when performing postural screening

Normal vs Kyphosis



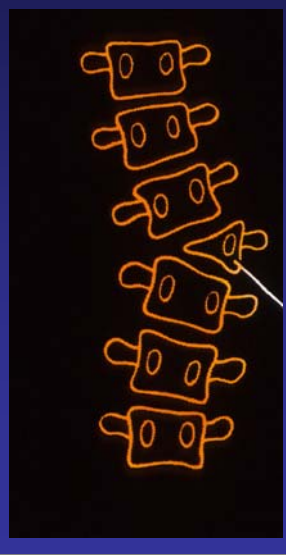
Looking from the side, gentle curves are normal in the neck, middle back and lower back. When these curves are increase in the thoracic area, it is termed increased Kyphosis

Scoliosis - Causes

- Idiopathic (Unknown Cause) – 80%
- Congenital (Abnormal Formation of Vertebrae)

In most cases (80%), the cause of scoliosis is unknown and is called Idiopathic Scoliosis. The remainder (20 %), are due to malformed vertebrae, muscle weakness, severe spine injury, lower extremity length discrepancy, or syndromes. One cause is abnormal formation of the vertebrae.

Congenital Scoliosis



Looking at a x-ray, the bones of the spine (vertebrae) are normally box or square shaped and stacked one on top of the other. When one or more of the vertebrae are wedge shaped, partially missing or fused together(malformed), the deformity is termed congenital scoliosis. The child is actually born with this deformity. It may progress with growth.

Scoliosis - Causes

- Neuromuscular (Muscle Weakness)
- Severe Injury (Paraplegia)
- Genetics
- Leg Length Discrepancy

Children with Neuromuscular Disorders such as Cerebral Palsy, Muscular Dystrophy, and Myelodysplasia have a higher incidence of scoliosis since they have an imbalance of muscle strength.
Children who have had a severe injury, paraplegia (spinal cord injury), also have a higher incidence of scoliosis.

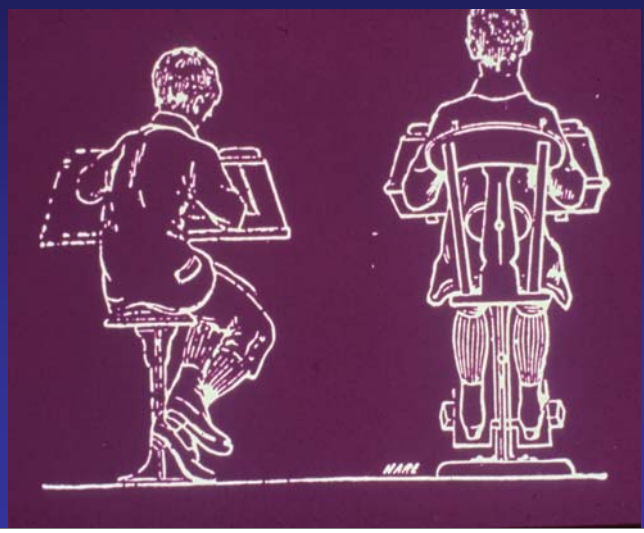
Scoliosis does run in families (20% incidence), but it has a variable pattern.

When a child has one leg longer (or shorter) than the other, scoliosis can develop.

Causes - Myths

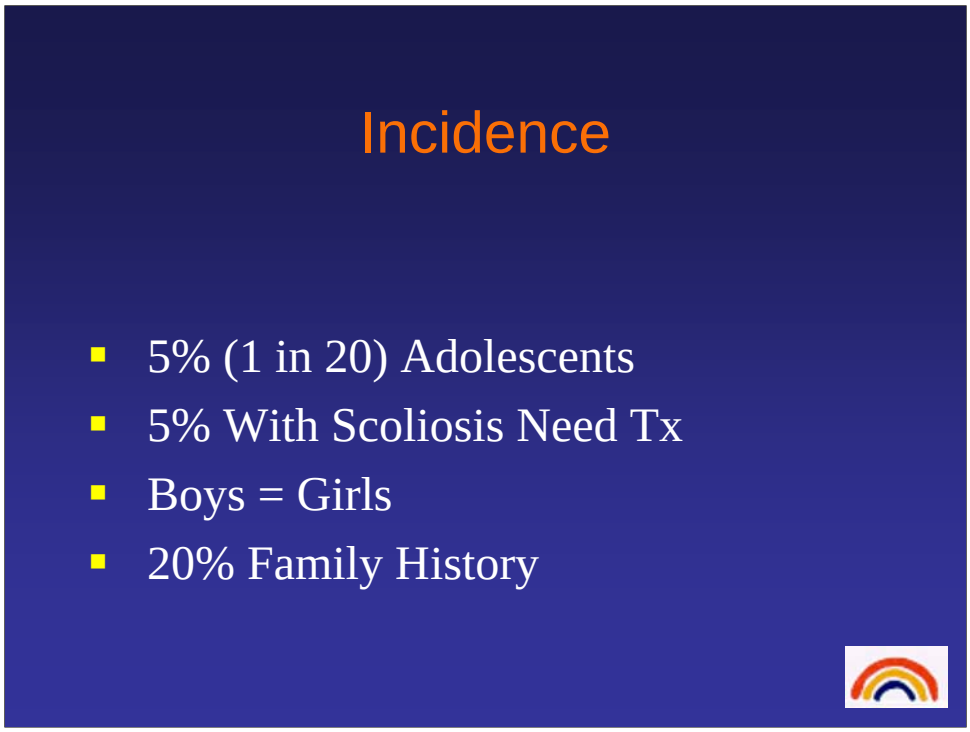
In the days of Hypocrites, it was thought falling on one's buttocks caused scoliosis. Falling does not cause scoliosis.

Causes - Myths



It was also thought that not having chair backs caused scoliosis. Not true. Scoliosis is also not caused by:

- Being left handed,
- Poor Posture,
- Carrying book bags or back packs on one arm, or
- Minor injuries.



One out of 20 adolescents (5%) have scoliosis. Only one out of 20 persons with scoliosis will need treatment.

Scoliosis occurs in boys and girls almost equally, although girls are more likely to progress and require treatments.

Long Term Effects

- Cosmetics
- Pulmonary
- Cardiac
- Functional Disability

Why treat scoliosis?

Large curves are usually not cosmetically expectable.

Changes in the heart and lung function can occur if a curve in the thoracic area is allowed to become very severe (>100 degrees).

Large curves also have the potential of causing functional disability and back pain as an adult.

Screening Procedure

- Have Child Stand With Feet Together
- Knees Straight
- Arms at Side
- Facing Forward

- With Palms Together, Bend Forward

When screening for scoliosis, the child should stand with feet together, knees straight, arms down the sides and facing forward. After assessing the child standing, have the child place palms together and bend over. In this position, scoliosis will be confirmed.

Normal Standing

Head above buttocks

Shoulders level

Waistline symmetrical

Normally:

The head is above the tailbone,

Shoulders are symmetrical in height,

Scapulas (shoulder blades) are equal in height and prominence.

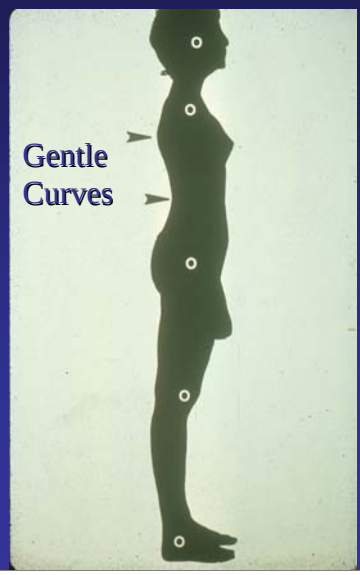
Waistline is symmetrical.

Normal – Forward Bend

Both sides
Symmetrical

Normally, when one bends forward the sides of the upper and lower back are symmetrical.

Normal - Lateral



Shoulders

Shoulders above hips, knees and ankles

No increase Kyphosis
No increase Lordosis

Normally, when looking at the side view, the ear lines up above the shoulders, hips, and knees. There is a gentle rounding in the thoracic and lumbar spine.

Normal Bend – Side

Smooth arch of thoracic spine

When forward bending, normally, a smooth gentle half circle is observed.

Scoliosis

One shoulder higher

Asymmetry of hips

Unequal distance between arms & body

A person with scoliosis could have one or more of the following signs:

Head not above the tailbone,

One shoulder higher than the other,

Scapula (or shoulder blade) uneven in height and level,

Waistline not level.

Scoliosis – Forward Bend

Asymmetry on forward bend

On forward bend, a person with scoliosis will have one side higher than the other (caused by the twisting of the spine).

Signs of Kyphosis

- Shoulders Hunch Forward Excessively
- Increase Rounding Of Spine in Thoracic Region
- Rounding is More Prominent On Forward Bending
- Increase Swayback

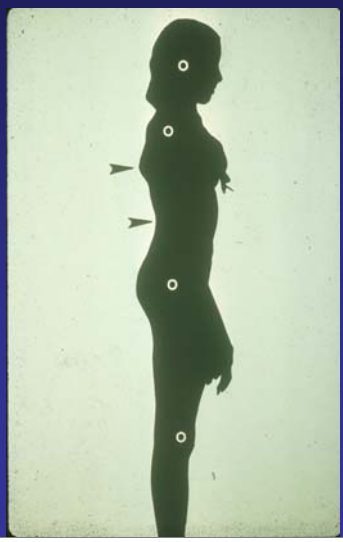
Possible signs of Kyphosis

Kyphosis

Head forward from body

Increase rounding

Increase lordosis



A person with increase Kyphosis could have:

Shoulders hunched forward

Increased rounding in the thoracic spine

Increase swayback in the lumbar spine

Kyphosis – Forward Bend

Rounding prominent on forward bend

On forward bend, a person with Kyphosis will demonstrated prominent rounding in the thoracic spine.

Touching their toes may be difficult.

Hands On / Clothes On Screening

- Boys *and* Girls Can Be Screened At The Same Time
- Decrease Anxiety with the Kids
- Screeners Feel More Confident With Results

The benefits of Hands On/ Clothes on Screening are several.

Boys and Girls can be screened at the same time, since both are fully dressed.

Keeping clothes on or not having to wear “special attire” during screening decreases anxiety.

When the screener looks and feels with her hands she will be more confident with her results

Place Hands on Shoulders

Look at your hands

Feel with your hands

Is one hand higher?

Hands Under Shoulder Blades

Is one hand looking more prominent?

Is one hand higher than the other?

Are thumbs pointing to each other?

Hands on Waistline

Is one hip higher than the other?

Scoliosis?

Head above buttocks?

Shoulders level?

Scapula symmetrical?

Waistline even?

Scoliosis suspected?

Since it is difficult to photograph children with scoliosis showing hands on technique, the following examples have children in bathing suits.

Ask yourself:

Is the child standing with her head above her tailbone?

Imagine:

Your hands on her shoulders.

Is one shoulder higher than the other? (yes)

Your thumbs hooked under her shoulder blades.

Is on shoulder blade higher? (Yes)

Your hands on each side of her waist.

Is her waistline uneven? (Yes)

Are you suspicious that this child might have scoliosis? (yes)

Scoliosis

Rib hump confirms scoliosis

After the child bends forward, assess to see if one side of the back is higher than the other. This is called a rib hump. This confirms whether the child has scoliosis or not. Be sure to look at the top, middle and low back for the asymmetry

The amount of rib hump shown here is typical of a child needing surgery.

Scoliosis?

Shoulders level?

Scapula symmetrical?

Waistline even?

Scoliosis suspected?

Head above tailbone? (yes)
Shoulders level? (No)
Shoulder blades even? (No)
Waistline even? (No)

Suspicious for scoliosis?

Scoliosis?

Rib hump confirms scoliosis

Bending forward demonstrates the R side a little higher than the left. This would be more typical of a patient with mild amount of scoliosis.

Scoliosis?

Shoulders level?

Scapula symmetrical?

Waistline even?

Scoliosis suspected?

Shoulders asymmetrical
Scapulas asymmetrical
Waistline asymmetrical
Suspicious of scoliosis?

Scolioisis

Rib hump confirms scoliosis

Yes, Rib Hump on R side. Refer for scoliosis.

Scoliosis?

Shoulders level?

Scapula symmetrical?

Waistline even?

Scoliosis suspected?

Shoulders level.
Scapulas symmetrical.
Waist line symmetrical.

Scoliosis?

No Scoliosis

No rib hump. No scoliosis.

Kyphosis?

When you look at this person from the side. She has increased kyphosis.

Kyphosis

Bending her forward confirms the kyphosis.

In order to screen properly, the person needs to be looked at from the back, side (for kyphosis) and front (to look for rotation in the lumbar spine when forward bending).

What About Obese Children?

What about children who are obese? Look for asymmetry of fat folds along with the other signs and symptoms of scoliosis and kyphosis. A lot of curvature can be hidden by fat, but it is also difficult to treat an obese person with a brace.

Look at each person individually.

Shoulders level?

Scapulas symmetrical?

Waistlines symmetrical?

Are you suspicious for one, none or both to have a spine deformity?

The person with the pink bathing suit has scoliosis. This is evident by the rotation or rib hump visible on the R side of her back.

The person in the green bathing suit is normal.

Screening Handicapped Children

- Sit Child In Chair To Level The Pelvis
- Bend Forward With Arms Between Legs.

If a child has a motor disability, examine them sitting. This levels their pelvis. Have them bend forward with their arms between their legs and touch their toes. Assess for the asymmetry from the back and front.

Many children have one shoulder higher than the other. If this is the only sign observed and asymmetry is not evident on forward bend, the child does not have scoliosis. Assessing the child while standing gives possible signs of scoliosis. The asymmetry on forward bend is what confirms scoliosis.

Pain is not associated with scoliosis. There may be discomfort over the mid thoracic rib hump due to shoulder blade displacement.

There is an increased evidence of back pain with Kyphosis.

Screening Organization

- Names By Grades (or Classes) in Alphabetical Order
- 3 Persons (2 Volunteers)
  - One To Screen
  - One To Document
  - One To Line Up Children
- Pass, Refer, Recheck, Absent

Organizing ahead of time is important and will help screening go smoothly.

Make a list of the students to be screened by class in alphabetical order.

It is helpful if at least three people are available to assist in the screening:

•One or two persons to screen,

•One person to record results,

•One or two persons to organize, line up and monitor the children in line.

The recorder will either mark Pass, Refer, Recheck or Absent.

Specific signs do not need to be listed since the child being referred will be evaluated thoroughly by the physician

Postural Screening can be performed in a number of places as long as the child's privacy is protected.

Possible Locations to Screen:

Locker Room - Line students up along the length of lockers with the screener and person being screened at the end of the locker. The recorder can stand in front of the student being screened. The end of the locker acts as a shield from the other students. After the student is screened, they can exit the locker room on the other side of the lockers.

School Library - The bookshelves in the school library can be used in the same way as the locker room.

Hallway outside a classroom - Students can line up in an empty classroom and be screened one at a time in the hallway.

Spinal Growth Females:

11 yr - Spurts Begins
(before breast and pubic hair)

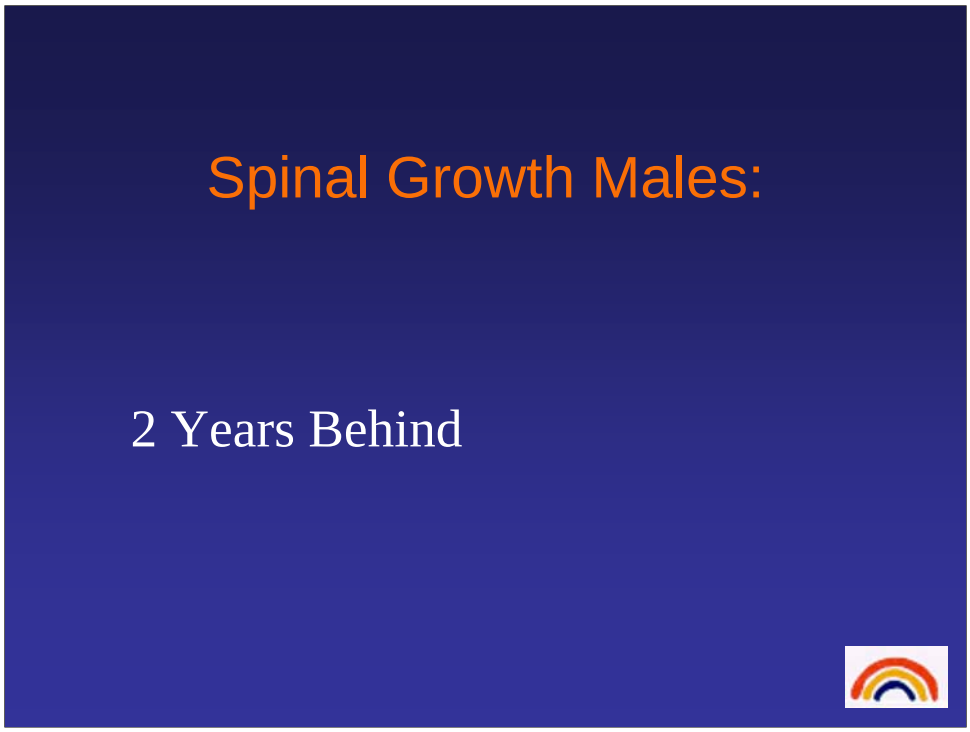
12 yr – Peak

13 yr – Menarche (2/3 growth spurt over)

14yr – Spurt Over

Treatment is based on a number of factors including curve magnitude and the amount of remaining growth. The larger the curve, the more growth potential, the higher the chance of curve progression

When a child is in a growth spurt (age 10-14), she has the highest chance of curve progression



Boys growth is usually two years behind.

Observation/Exercise

- Mild Curves (10-25 Degrees)
- Clinical Examination Periodically Until End of Growth
- Exercise Alone Does *Not* Affect The Curve

Most of the time, curves are mild (10-25 degrees) and no active treatment is needed. The child will need to be examined every four to six months, until full grown, to be sure the curve does not increase. Since scoliosis has the potential of increasing before growth is completed, it is important that the spine be checked regularly until the end of growth.

Exercise is good for everyone, but will not prevent scoliosis from getting worse. Sometimes exercise can help improve kyphosis and relieve back pain.

Bracing

- Moderate Curvatures (25- 45 degrees)
- Purpose – To Prevent Moderate Curves From Growing Worse *While the Child is Still Growing*
- Does Not Improve The Curve
- 70% Effective

Braces are used to prevent moderate curves (25-25 degrees) from getting worse until the child is full grown and mature.

Some braces are worn only at night and others are worn approximately 22 hours a day.

Bracing is successful in approximately 70% of the time. It does not make the scoliosis better but can prevent progression.

Child can usually continue with physical education classes and sports.

Milwaukee Brace

Milwaukee brace used for curves in the high thoracic area and for kyphosis.

Milwaukee Brace - Side

Side view of a Milwaukee brace

LSO – Lumbar Sacral Orthosis

LSO – Lumbar, Sacral Orthosis. Used for Lumbar curves.

Nighttime Bending Brace

Providence bending brace. Only worn at night for ten hours.

Spine Fusion

- Large Curves (>45 degrees)
- Recommended When No Other Treatment Can Prevent The Curve From Getting Worse.

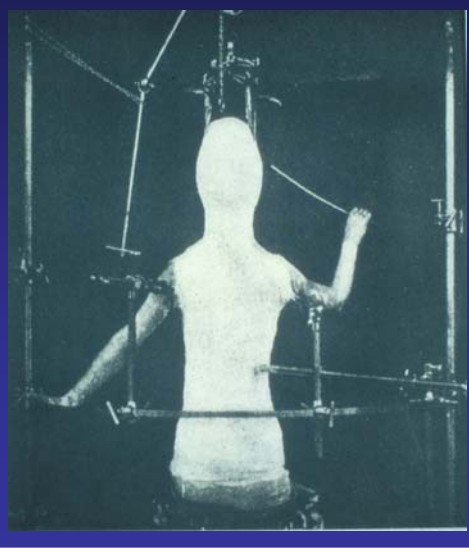
Surgery is recommended when no other kind of treatment can prevent the curve from getting worse or when the curve is too large to brace.

Purpose

- To Stop The Curve From Getting Worse
- Straight vs Straighter
- Balance

The purpose of a spine fusion is to stop the curve from progressing. The curve is also corrected as much as safely possible.

We’ve Come a Long Way



Treatments have improved greatly since long ago.

Posterior Spine Fusion

The top two vertebrae are normal vertebrae. The next four vertebrae demonstrate vertebrae that are fused together. Vertebrae are fused together by removing the top surface of the bones (decorticating) and placing bone graft in the area. Rods (or instrumentation) holds the spine in the desired position while the bones grow or fused together.

Pre Op - Scoliosis

This child has a 74 degree thoracic curve and a 39 degree lumbar curve preoperatively.

Post Op - Scoliosis

Postoperatively, the curves are reduced to 20 degree and 11 degrees. The instrumentation is visible on this radiograph.

Brown Belt – Post Op

The person in the middle received his brown belt after recovering from spine surgery for scoliosis.

What Grades Should You Screen?

- Depends on Availability of Resources

- 4 Grades – 5th, 6th, 7th, 8th
- 3 Grades – 5th, 6th, 7th
- 2 Grades – 6th, 7th
- 1 Grade – 7th

Optimally, children should be screened yearly in grades fifth through eighth. If resources are limited and only three grades can be screened, 5th, 6th, 7th grades are recommended;Two grades – 6th , 7th; One grade – 7th.

Resources

- National Scoliosis Foundation
  - www.scoliosis.org
  - 1-800-673-6922
  - “Growing Straighter and Stronger”
- Scoliosis Association, Inc
  - www.scoliosis-assoc.org
  - 1-800-800-0669

Resources

- Scoliosis Research Society

  www.srs.org

  414-289-9107

- American Academy of Orthopaedic Surgeons

  The Orthopaedic connection

  www.aaos.org

Resources

- University Hospitals of Cleveland

  Pediatric Orthopaedics

  Connie Poe-Kochert CNP

  216-844-5420

Feel free to call with questions.

Questions??