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# Scoliosis: update on assessment and treatment

By Dr Brian Hsu, Orthopaedic Spinal Surgeon (Paediatrics) and Dr Bhisham Singh Orthopaedic Spinal Surgeon

**Scoliosis is an abnormal curvature of the spine and is a three-dimensional deformity with side-to-side curvature and rotation of the spine. In the AP view, the cervical, thoracic and lumbar spine should be a straight line. In the Lateral view, the normal spine has a thoracic kyphosis and lumbar lordosis.**

It's estimated that the cause of about 85% of scoliosis cases is idiopathic. Early diagnosis and treatment of scoliosis is vital for a person's long-term health and quality of life.

## Scoliosis and age

Scoliosis can occur at any age, but it is most commonly diagnosed in people aged between 10-14 years. About 2-3% of children and teenagers are affected by scoliosis with a greater incidence among girls than boys.

Paediatric scoliosis is present when there is more than 10° of coronal curve and when there is less thoracic kyphosis than normal.

Adults commonly develop lumbar degenerative scoliosis and adults also commonly lose their lumbar lordosis with age causing "Flat-back Syndrome" and a stooped posture.

## Types of scoliosis

- Idiopathic scoliosis which can be further classified as:
  - Early Onset (<5 years of age)
  - Late Onset (>5 years of age)
  - Adult
- Congenital scoliosis
  - Born with a vertebrae that is partially formed or malformed, causing uneven growth
- Neuromuscular scoliosis
  - Cerebral Palsy, Syringomyelia and other Syndromes (Marfan's, Duchenne's) are often associated with the development of scoliosis

## Clinical assessment

The goal of the clinical assessment is to identify any underlying cause, assess the severity and determine if the curve is typical or atypical.

Critical elements to determine during history taking include:

- Pre-existing pain conditions
- Neurologic symptoms or signs e.g. weakness, numbness
- Family history of scoliosis – a first degree relative with scoliosis has a greater risk
- Developmental history e.g. recent growth spurt, menarche

## Scoliosis symptoms include:

- Head not centred with the rest of the body
- Difference in shoulder height
- Difference in shoulder blade height with one possibly protruding more
- Curved spine
- Difference in hip height or position
- Difference in the way the arms hang when standing straight
- Poor or unusual posture
- Back pain or discomfort in lower or middle back region
- When bending forward, sides of the back may appear different in height.

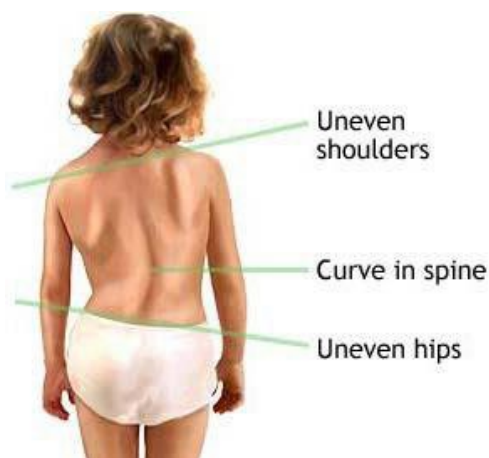


Figure 1. What to look for?

In the clinical examination, assess the body asymmetry, elevation of the shoulder and prominence of the scapula (Figure 1).

Deformity is measured by the Adam's forward bend test and demonstrates asymmetry of the rib cage. In this test, the standing patient bends forward from the waist, and the examiner uses a scoliometer to measure symmetry between sides (Figure 2).



Figure 2. Deformity from scoliosis

A detailed neurological examination is required to assess tone, power, reflexes and sensation of upper and lower limbs.



Figure 3. Full length standing plain radiograph of spine.

## Radiological assessment

Plain radiographs of the full length of the spine, including the top of the iliac crests should be obtained for patients with structural scoliosis (Figure 3).

The Cobb angle measures the most significant magnitude of the curve from the superior endplate of the upper vertebral body to the inferior endplate of the lower vertebral body involved in the curve (Figure 4).

EOS imaging is increasingly being used for the assessment of scoliosis deformities to evaluate the spinal alignment, as well as the alignment between the spine and the rest of the musculoskeletal system.

## Treatment

Treatment options for scoliosis varies depending on the severity of the curve and growth potential. Non-operative treatments consist of observation of the curve and monitoring with plain radiographs every 4-6 months and bracing to slow down the rate of the curve progressing.

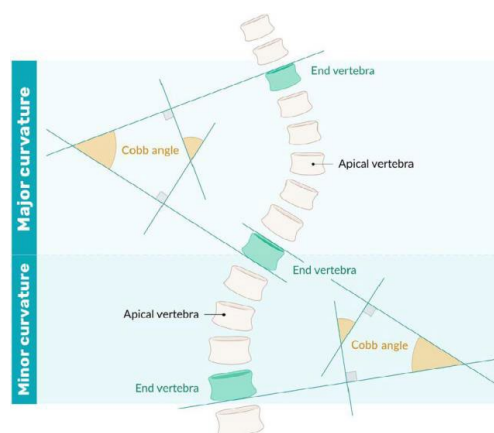


Figure 4. The Cobb angle is measured between the two most tilted vertebrae.

Referral to an orthopaedic spinal specialist is appropriate for patients with curves  $>10^{\circ}$ .

For younger immature patients the more urgent the referral. A 10 year-old with a  $20^{\circ}$  curve is more likely to progress than a 15 year-old with the same curve magnitude. Table 1. Shows the magnitude of curve at initial detection versus age.

Table 1. Magnitude of curve at initial detection versus age

Curve Magnitude at detection (degrees)	Age (years)		
	10-12	13-15	16
<19	25%	10%	0%
20-29	60%	40%	10%
30-59	90%	70%	30%
>60	100%	90%	70%

(From Nachemson, A.; Lonstein, J.; and Weinstein, S.;  
Report of the Prevalence and Natural History Committee,  
S.R.S. 1982.)

## Conclusion

The younger the patient, the greater the risk the curvature of the spine will progress. If scoliosis goes untreated, the long term implications can include increasing malalignment, fatigue, pain, physical disability and complications of the lungs and abdomen. The aim of the spinal surgeon is to assess and monitor a patient with scoliosis, and to intervene if and when needed