Pediatric Scoliosis OMT Module

AOBP with thanks to:

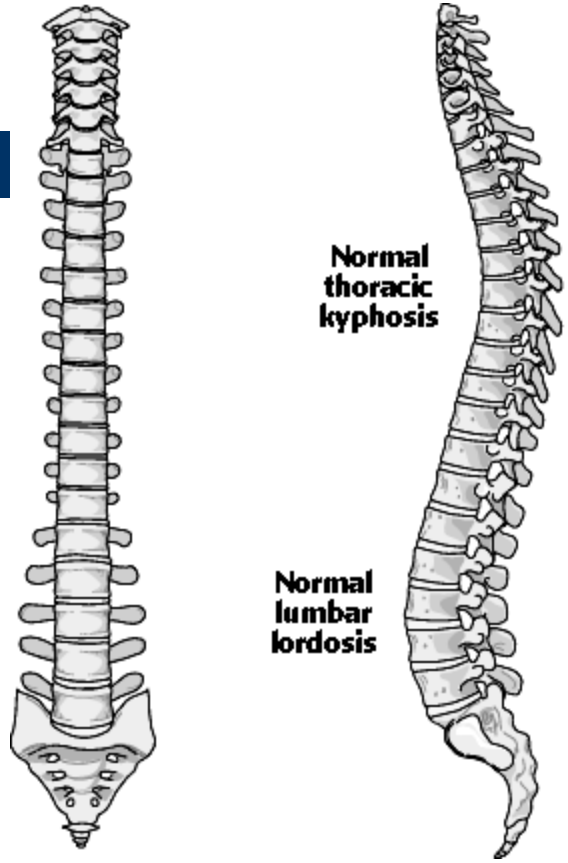
- Dawn C. Dillinger, DO
- Robert Hostoffer, DO, FACOP, FAAP
- Eric Hegybeli, DO

Pediatric Spinal Mechanics

- Newborn lumbosacral angle begins to form as early as the fourth month of gestation
- Cervical lordosis is apparent at birth and increases during infancy with efforts to hold head erect
- Lumbar lordosis does not appear until upright weight bearing is attained
- Postural curves develop with weight bearing during childhood

Scoliosis

- Defined as a lateral curvature of the spine with greater than a 10 degree angle
- Seen in about 5% of males with an average age of presentation at 14 years old
- Seen in about 10-14% of females with an average age of presentation at 12 years old
- Can present during routine physical, as an asymmetrical appearing spine or back pain


Normal thoracic kyphosis
Normal lumbar lordosis

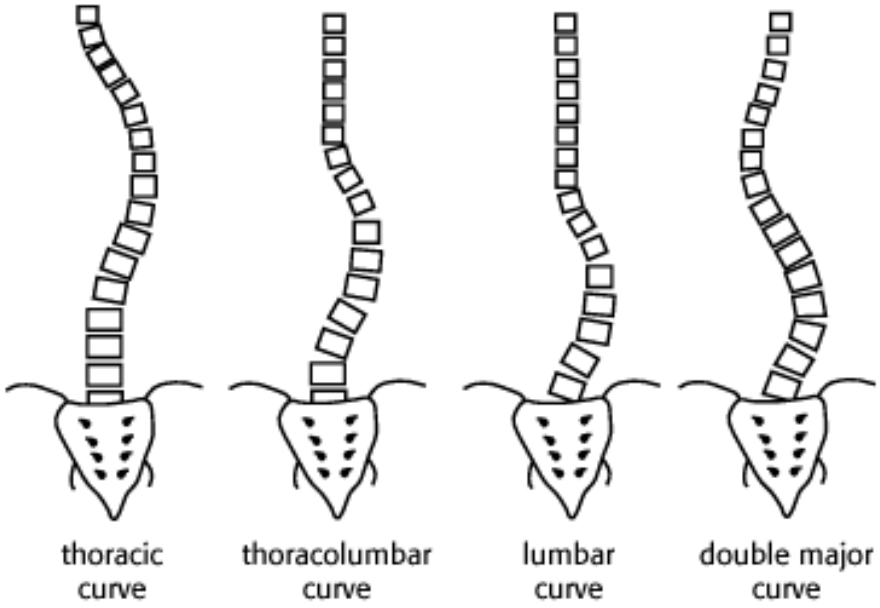
Scoliosis

- Most cases diagnosed between 10-15 years of age
- Curvatures more likely to progress during times of rapid bone growth
  - First 2-3 years of life
  - Adolescent growth spurt
- Named according to direction of convexity of the curve
- Can be structural or functional

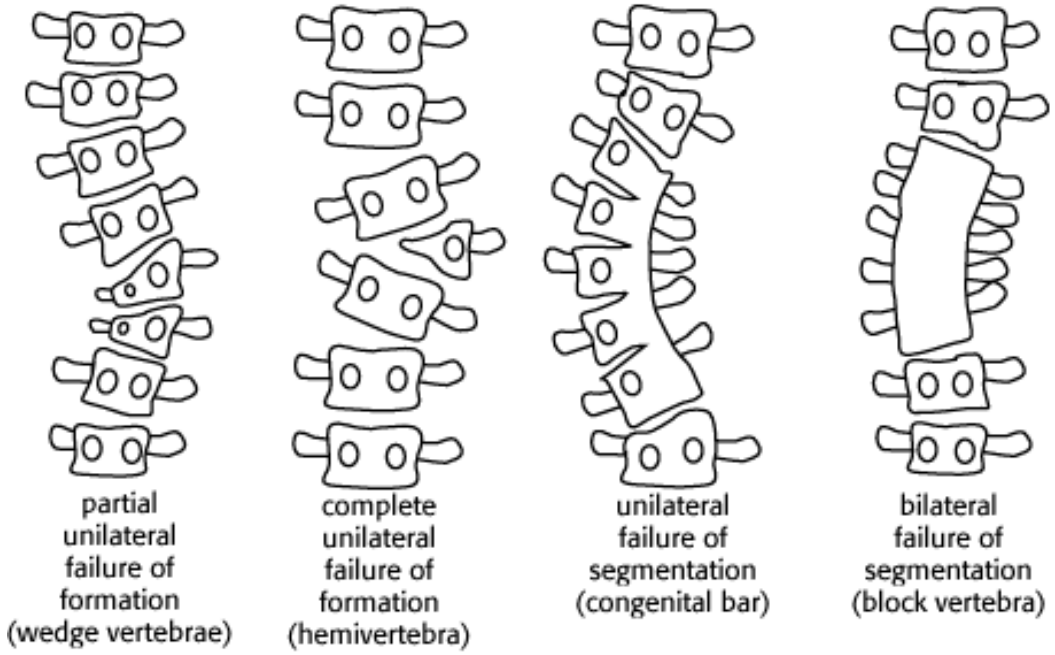
Structural Scoliosis Causes

- Idiopathic (most common~70% of cases)
  - Unknown cause, but some are possibly related to unlevel sacral or cranial bases
- Congenital
  - Presents prior to 1 year of age
  - Begins as early as 6th week of gestation
  - Can have associated visceral and intraspinal abnormalities
- Acquired
  - short leg syndrome
  - Healed leg fracture or other trauma
  - Psoas syndrome
- Neuromuscular (i.e. polio)

Types of Curves



Congenital Scoliosis

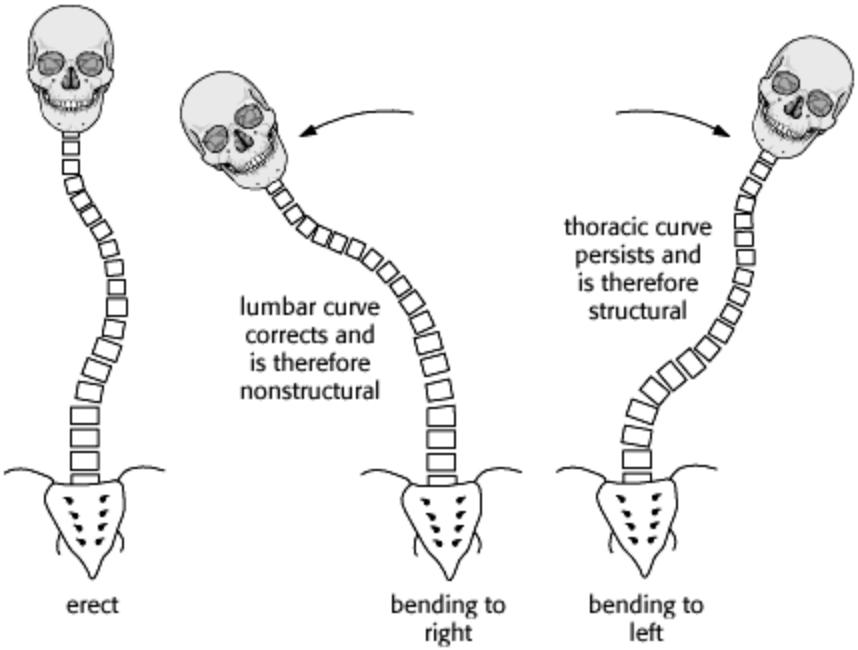


Functional Scoliosis

- Functional scoliosis curves go away with side-bending, rotation and forward-bending
- Patient should forward bend at waist until maximal rib hump appears
- While forward-bent, have patient swing upper body to left then right while observing if rib hump reduces
- Rib hump reduction=functional scoliosis

Forward-Bending Test

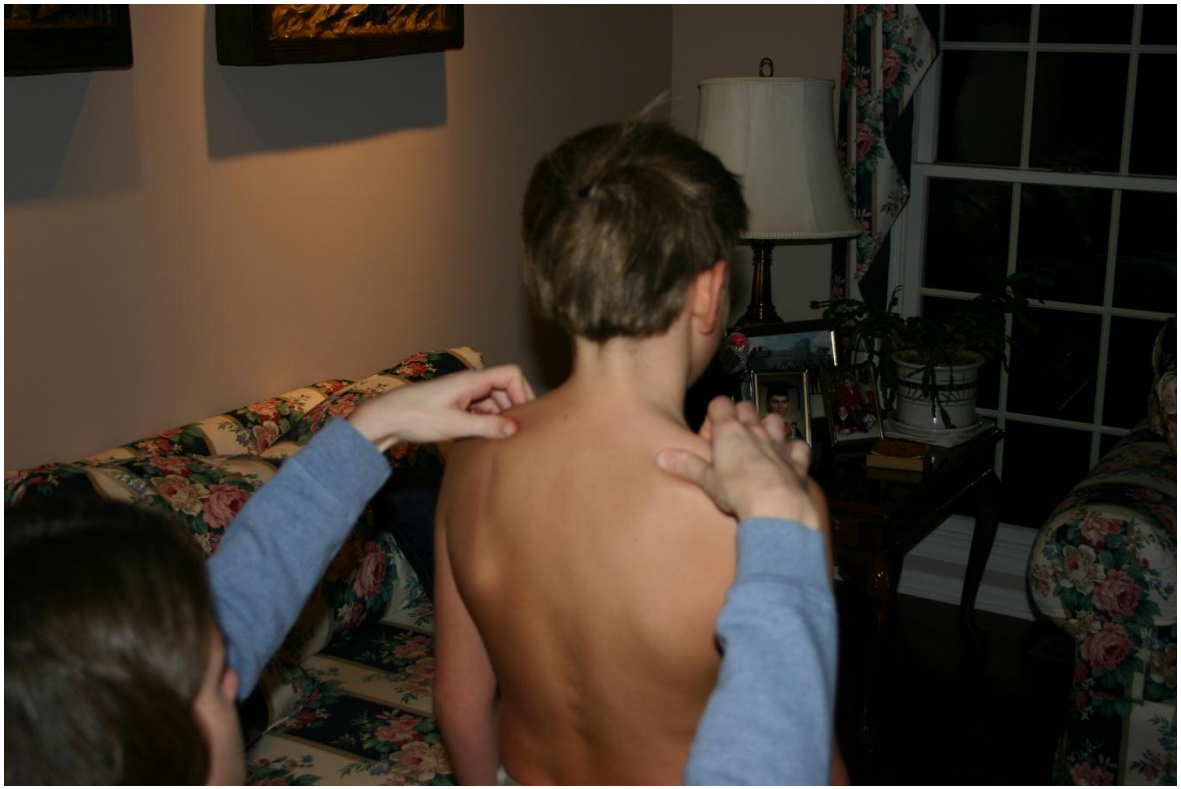
Functional Scoliosis



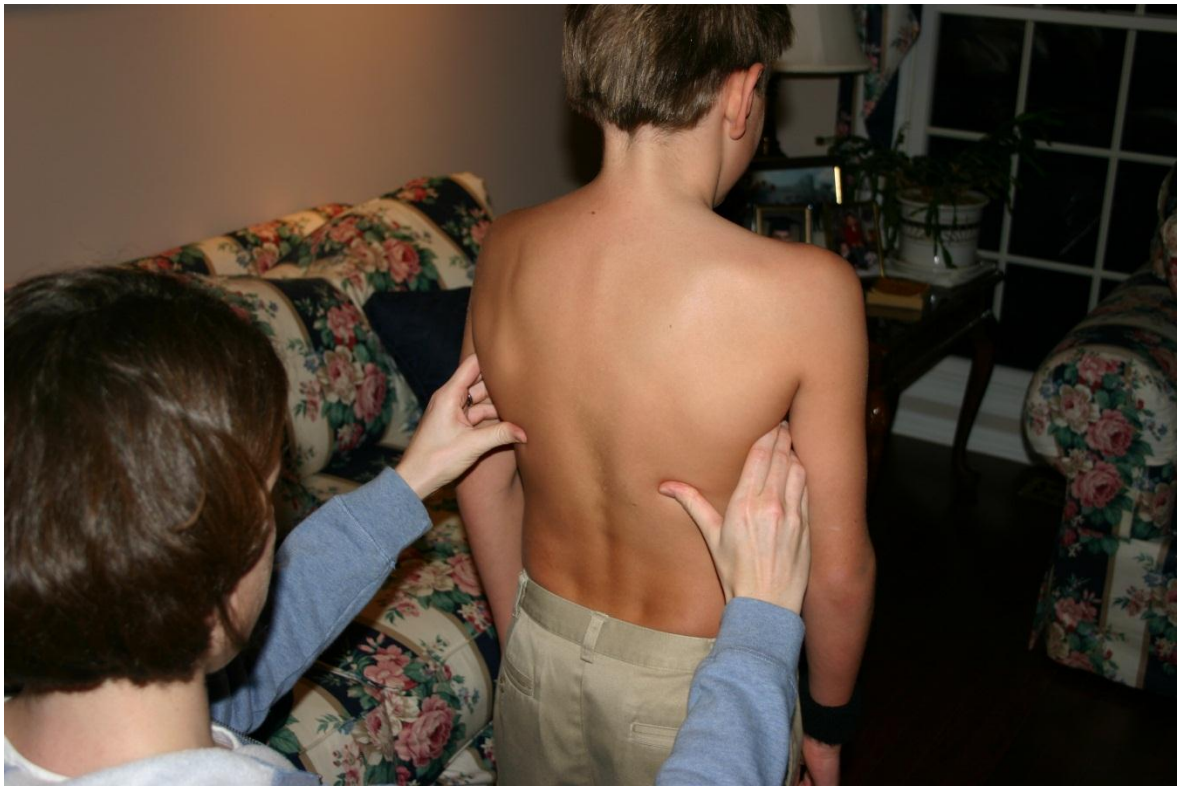
Osteopathic Approach to Scoliosis Diagnosis

- Examine patient in standing position to look for asymmetry of the following: arm length, scapular height, occipital leveling, iliac crest heights, PSIS, trochanteric planes
- Forward bending test including assessment for functional scoliosis
- Assess for short leg, sacral dysfunction, pelvic shear dysfunction

Shoulder Leveling



Scapular leveling

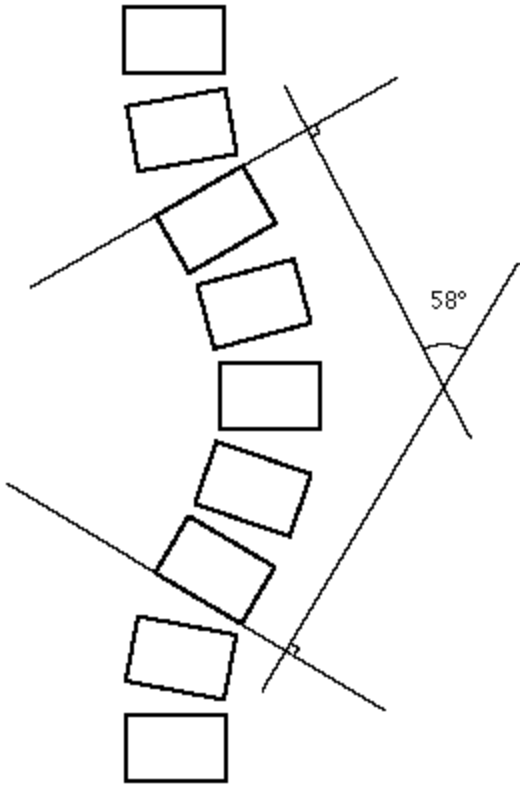


Spinal Inspection

Osteopathic Approach to Scoliosis Diagnosis

- Correct any somatic dysfunction with OMT, then re-check exam findings to verify scoliosis diagnosis
- Scoliosis and postural X-rays should be taken soon after OMT to provide most accurate diagnosis
- Scoliosis curves are measured by Cobb method on X-rays

Cobb's Angle



Cobb Method

- Uses upper end vertebra of spinal curve as superior border
- Uses lower end vertebra of spinal curve as inferior border
- Good interval measure of progression of scoliosis over time
- Significant progression is greater than 5 degree increase in curve over 5 months

Clinical Manifestations

- Curves are more likely to progress if significant growth of the child remains
  - Pre-menarche
  - Tanner I or II
- Uncommon progression when females are 2 or more years post-menarche
- Lumbar curves are more likely to progress

Scoliosis - Progression

- Orthopedic consult considered for curves >20 degrees or complicated
- Surgery considered for progressive thoracic curves >45 degrees
- Greater angles of thoracic scoliosis can be correlated to heart or lung impairment
- Undiagnosed scoliosis in pediatrics can present in adults as back pain

Pediatric Back Pain

- Can present at any age
- Red flags in back pain
  - constant pain
  - pain unrelieved by rest
  - pain wakes patient from sleep
  - Fever and chills associated
  - Associated weight loss, fatigue
  - Neurologic dysfunction (incontinence, weakness)
  - Pain worsened in extension

Prevalence and Relevance

- OMM clinic tracked pediatric patient usage of services for one year
- Ages 5-12 years: 13.6% of patients presented for OMT secondary to scoliosis
- Ages >12 years: 15.7% of patients presents for OMT secondary to scoliosis
- Ages 5 year and greater: 5-6% presented for OMT related to leg length discrepancy

Scoliosis and Leg Length Discrepancy

- Leg length discrepancy for any reason can present with a compensatory lumbar scoliosis curve
- Pelvic tilt is toward the short leg
- Scoliosis curve is concave toward the short leg
- Possibility that heel lift in short side could help treat scoliosis and related back pain

Evidence-Based Medicine

- AOA developed guidelines 2010 by comparing studies of OMT vs. placebo for low back pain treatment
- 8 randomized controlled clinical trials were used comparing OMT vs. control
- Results showed significant reduction in low back pain after OMT vs. control groups
- Reduction in low back pain was consistent at short, intermediate and long term follow-ups

Evidence-Based Medicine

- NEJM study of 155 adult patients: average age 18-38 years old
- Randomized, controlled trial, not blinded except for at exit interview
- Patients had low back pain 3 weeks-6 months duration
- 83 patients had OMT, 72 patients received standard medical care for low back pain

Evidence-Based Medicine

- At the end of the study, 90% of patients in both groups showed improvement
- The OMT group showed significantly less medication use for pain, and less physical therapy
- All patients were seen for 8 visits
- Even with same number of visits, authors concluded less costly with OMT due to less prescription NSAID and muscle relaxant use.
- Less NSAID use means less risk of side effects pertaining to their use

Osteopathic Approach to Treatment of Scoliosis

- OMT can be a useful adjunct in treating mild scoliosis
- Severe scoliosis occurs with Cobb angle greater than 20 degrees and should be referred to specialist

Osteopathic Approach to Treatment of Scoliosis

- Goals of OMT: flexibility, improved spinal balance, possibly prevent progression
- OMT is not meant to straighten the spinal curve, but to optimize function of the existing structure

Osteopathic Considerations - Infants

- Infantile scoliosis can be approached by addressing the occiput (usually with cranial), cervico-thoracic and sacroiliac areas
- German osteopathic physicians studied 32 infants born at term, age 6-12 weeks old, with no underlying medical diagnoses but a diagnosis of postural asymmetry
- Weekly OMT for 4 weeks including craniosacral and balanced ligamentous techniques

Osteopathic considerations-infants

- After OMT: 13 infants improved, 3 had no change, none were progressively worse
- Study included a sham group
- Sham group: 5 infants improved, 8 had no change, 3 were progressively worse
- Statistically significant improvement in postural asymmetry in infants with OMT
- Authors suggested that if asymmetry was left uncorrected, other studies have indicated could result in scoliosis and gait abnormalities

Question 1

1. A 13 year old patient presents for sports physical. She is healthy. Menarche was 11 months ago. On forward bending test, you notice a thoracic rib hump. You diagnose her with scoliosis. What is the next step in her management?

   A. Bone scan

   B. Heel lift left leg

   C. Oblique flexion X-rays of the thoracic spine

   D. Osteopathic manipulative treatment

   E. Re-check with scoliometer in 12 months

Question 2

2. Which of the following has been found to decrease in a patient treated with OMT for low back pain?

   A. Chiropractic visits
   B. Cortisol levels
   C. Lumbar range of motion
   D. NSAID use
   E. Serotonin levels

Question 3

3. Which of the following is concerning for significant progression of a scoliosis curve as measured by Cobb angle?

   A. 5 degrees in 5 months

   B. 5 degrees in 10 months

   C. 5 degrees in 15 months

   D. 5 degrees in 2 years

   E. 5 degrees in 5 years

Question 4

4. Which of the following spinal curves in present in the newborn period?

   A. All curves are present
   B. Cervical lordosis
   C. Lumbar lordosis
   D. Thoracic lordosis
   E. Thoracic kyphosis

Question 5

5. A 14 year old girl presents after a friend noticed a mass in her back during gym class. On forward flexion at the waist, you notice a rib hump of the right thoracic spine. When she swings her upper body to the left, the hump disappears. Which of the following is the correct diagnosis?

   A. Congenital scoliosis
   B. Functional scoliosis
   C. Idiopathic scoliosis
   D. Neuromuscular disease
   E. Short right leg

References

- Kuchera M, Kuchera W. Osteopathic considerations in systemic dysfunction, 2nd ed. Greyden Press; 1994: 171-179.

- Ward, R. Foundations for osteopathic medicine. Williams and Wilkins; 1997.

- Phillippi H, et al. Infantile postural asymmetry and osteopathic treatment: a randomized therapeutic trial. Dev Med Child Neurol. 2006; 48 (1): 5-9.

References

- Kliegman R, et al. Nelson textbook of pediatrics, 18th ed. Saunders. 1997.

- Lund G, Carreiro J. Characteristics of pediatric patients seen in medical school-based osteopathic manipulative medicine clinics. JAOA. 2010; 110 (7): 376-380.

- Seffinger M. American osteopathic association guidelines for patients with low back pain. JAOA. 2010; 110 (11): 653-666.

References

- Andersson GB, Lucente T, Davis AM, et al. A comparison of osteopathic spinal manipulation with standard care for patients with low back pain. NEJM. 1999; 341: 1426-1431.