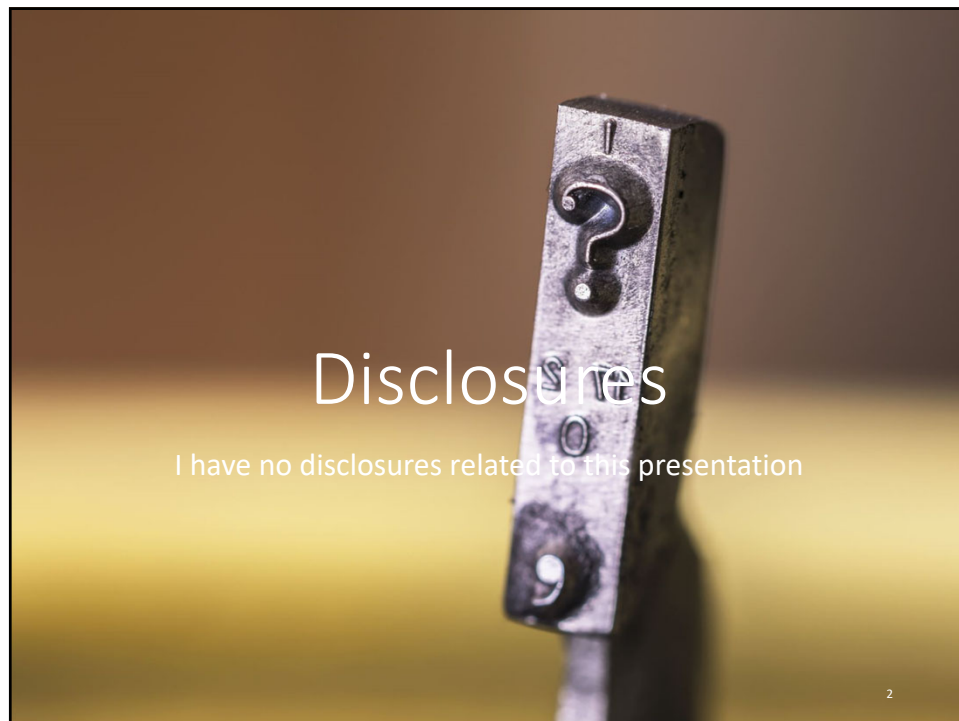


1



2

Training Background

Medical School: Drexel College of Medicine - Philadelphia, PA

Residency: Rutgers – New Brunswick, NJ

Fellowship: Texas Scottish Rite Hospital For Children – Dallas, Tx



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Diagnosis, Evaluation, and Treatment of Scoliosis

Objectives

congenital, infantile,
neuromuscular,
juvenile, and
idiopathic scoliosis

Learn Associated
Pathology

Basic Treatment
Algorithms

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Scoliosis Definition

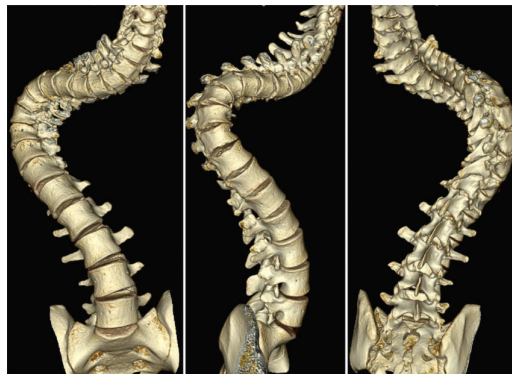
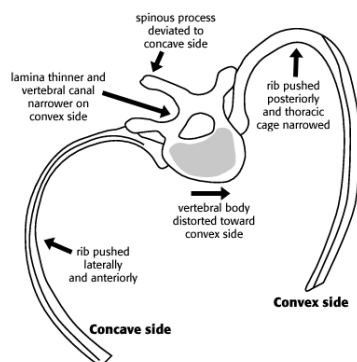
- **Scoliosis**
 - 10 degrees or greater of curvature
- **<10 degrees = Spinal Asymmetry**
 - If skeletally immature, requires follow up to monitor for progression to possible scoliosis



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3 DIMENSIONAL DEFORMITY



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Scoliosis Subtypes:

Diagnosed <10 years of age

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High Incidence of Neural Axis Abnormalities

Syrinx

Arnold-Chiari syndrome

Tethered cord

Dysraphism

Spinal cord tumor

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Infantile Example



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Epidemiology

Incidence

- 5% of idiopathic scoliosis cases

Demographics

- males > females

Anatomic location

- usually left thoracic curve

Risk factors/Genetics

- Family history
- Autosomal Dominant with variable Penetrance

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Associated Conditions



Associated conditions

Plagiocephaly
Congenital Defects



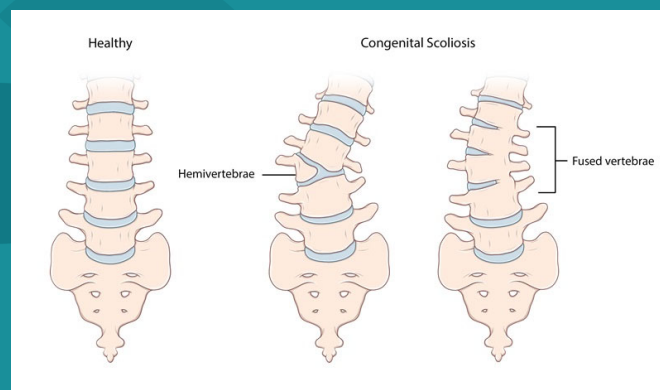
Neural-Axis Abnormalities

20-40% of patients

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Congenital Abnormally Shaped Vertebrae



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Associated Conditions

Systemic Anomalies (38-58%)

- Cardiac defects - 10%
- Genitourinary defects - 25%
- Spinal cord malformations - 20-40%

Can be part of an underlying syndrome or associated with a chromosomal abnormality

VACTERL Association

Vertebral malformations

Anal atresia

Cardiac malformations

Tracheo-Esophageal fistula

Renal & radial anomalies

Limb defects

Juvenile Scoliosis 3-10 years of age

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Epidemiology

Incidence

- 10% of all idiopathic scoliosis cases

Demographics

- Females > males

Anatomic location

- Most commonly right main thoracic curve

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Other Types of Scoliosis....

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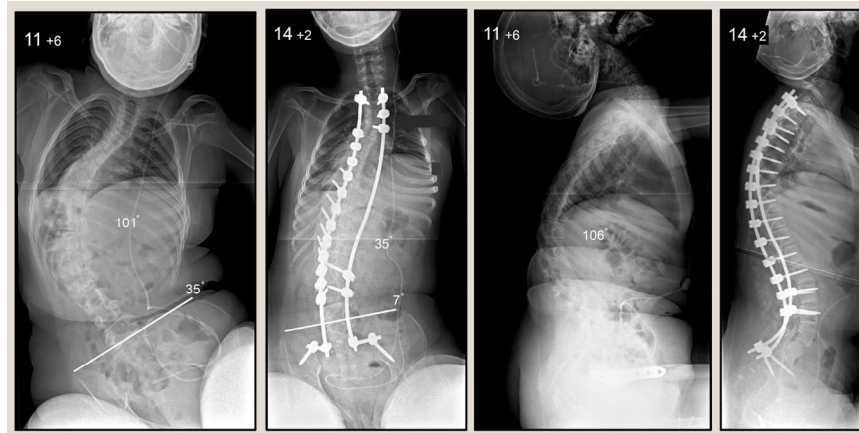
19

Neuromuscular Scoliosis
Caused by disorders of the
brain, spinal cord, and muscular
system

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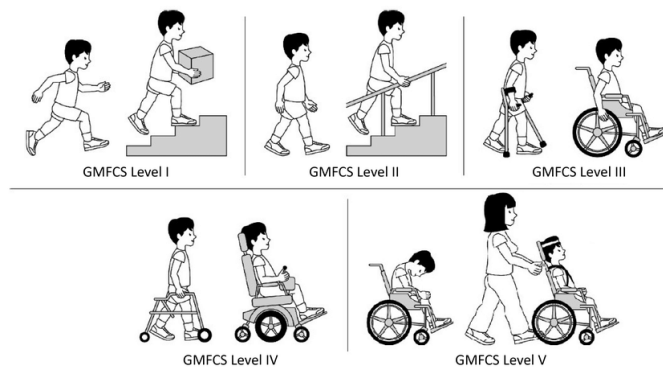
Neuromuscular Scoliosis Example



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GMFCS Classification



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Adolescent Idiopathic Scoliosis

Age 10-18 years
Most Common

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Demographics

Children 10 to 18 yrs

10:1 female to male ratio for curves > 30°

Right thoracic curve most common

Left thoracic curves are rare
(investigate with a MRI)



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Reaching a Diagnosis of Scoliosis

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History

When Was the Scoliosis Identified?

Is Patient Experiencing Pain?

Neurologic Symptoms?

Family History?

Growth Remaining?

- *With increased growth remaining comes increase risk of curve progression*

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Red Flags

Painful Scoliosis

Scoliosis rarely causes pain

Differential Diagnosis:

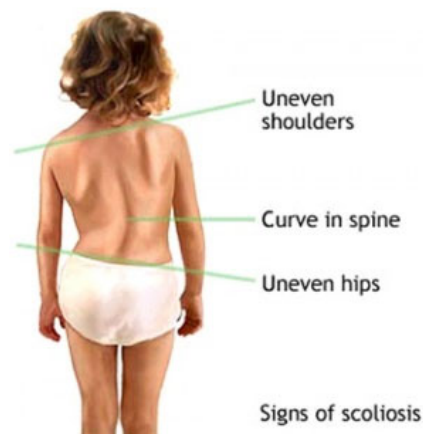
- *Infection*
- *Benign neoplasm*
- *Malignant neoplasm*
- *Spinal cord abnormality*
- *Spondylolysis or Spondylothesis*

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Physical Exam Pearls

- Shoulder asymmetry
- Unequal scapular prominence
- Elevated or prominent "hip"
 - Abdominal/flank asymmetry
- Head not centered over pelvis



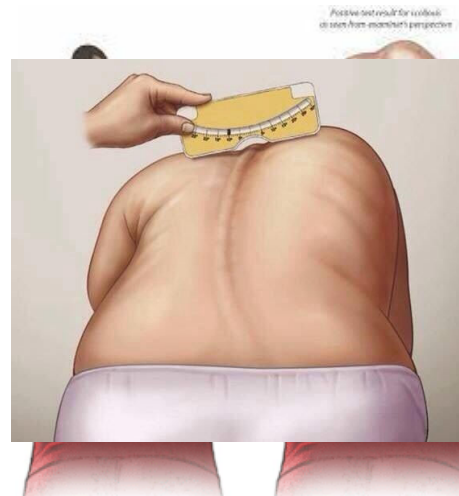
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Adams Forward Bend Test

The patient bends forward at the waist until the back comes in the horizontal plane

- Feet together
- Knees extended
- Arms hanging



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Atypical Physical Exam Findings

Café Au Lait Spots

Axillary or Inguinal Freckling

Hairy Patch

Sacral Dimple



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Neurologic Examination

Gait Exam

Strength

Sensation

Deep Tendon Reflexes

Babinski Sign

Clonus

Abdominal Reflexes

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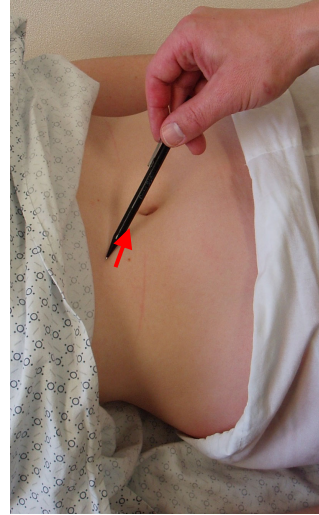
Abdominal Reflexes



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Abdominal Reflexes



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Abdominal Reflexes



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Radiographs

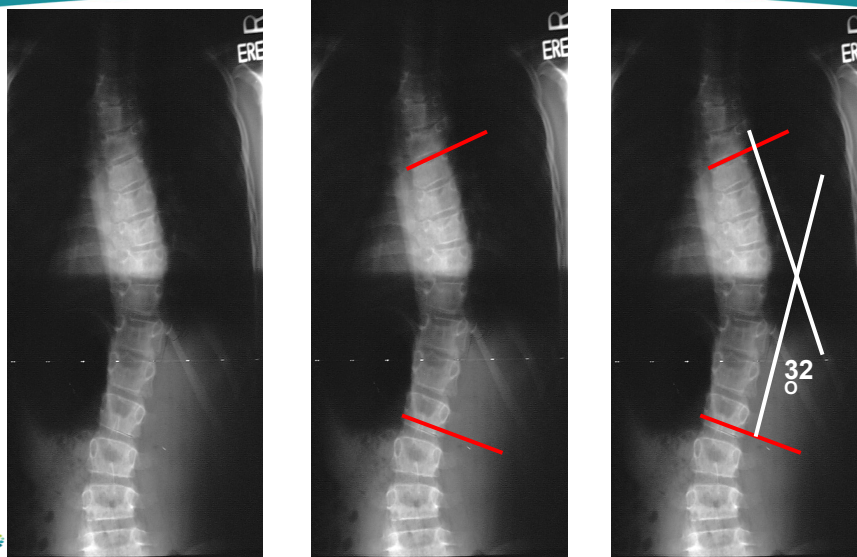
- Full-Length & Standing
 - P-A
 - Lateral



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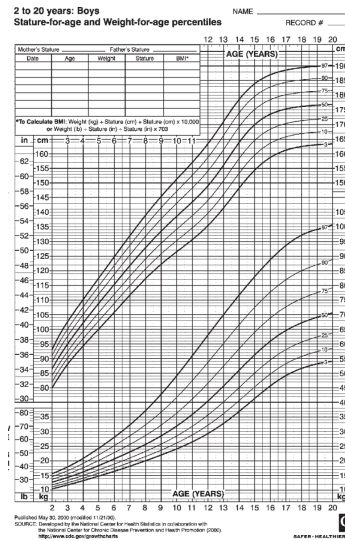
Cobb Angle Measurement



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Skeletal Maturity Assessment

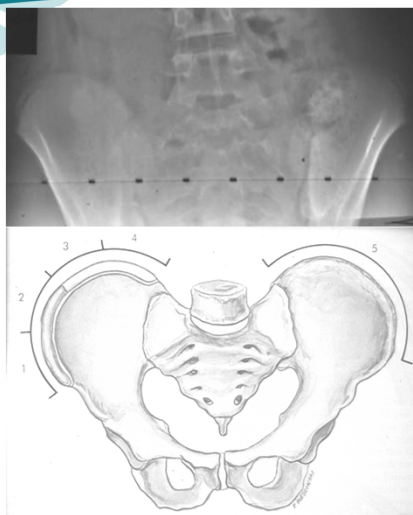
- Calendar age & Height over time
- Sexual maturity
 - Tanner staging
 - Menarche
- Skeletal age
 - Risser sign
 - Elbow apophysis
 - Proximal Humerus
 - Left Hand Xray
 - Sanders Classification



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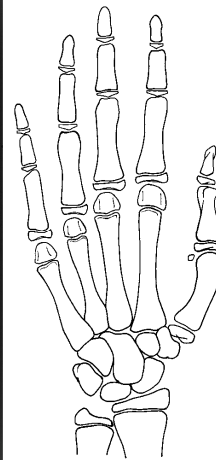
37

Risser Sign



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Sanders



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Treatment of Scoliosis

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Treating Scoliosis



Why do we treat?



Curves $< 30^\circ$ cause no problem



Curves $> 50^\circ$ consistently cause problems



Curves $> 90^\circ$ shorten
life expectancy

Significant Pulmonary
Complications

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Treatment Options

Observation

- Curves $<20^\circ$

Bracing

- Curves between $25-45^\circ$

Casting

Halo/Traction

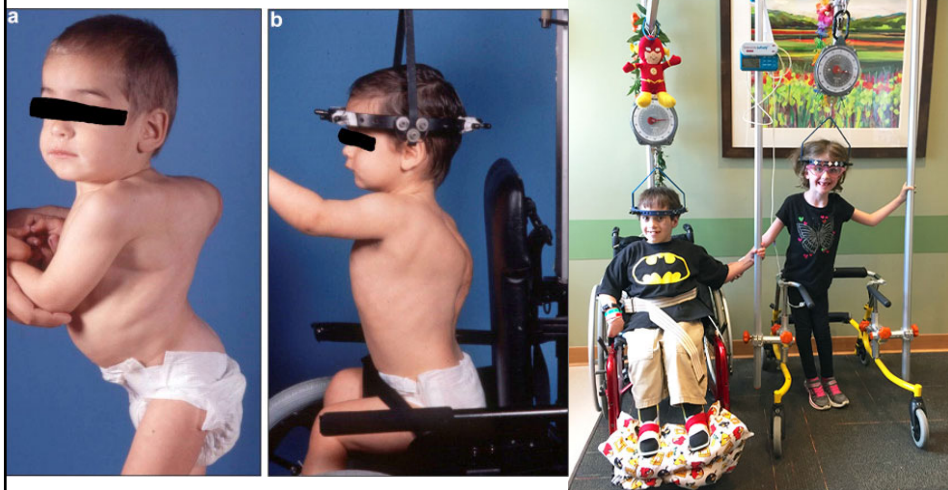
Surgery

- Curves $>50^\circ$

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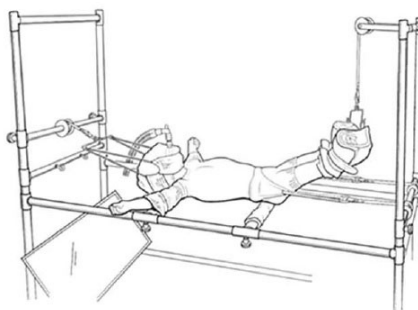
Halo Traction



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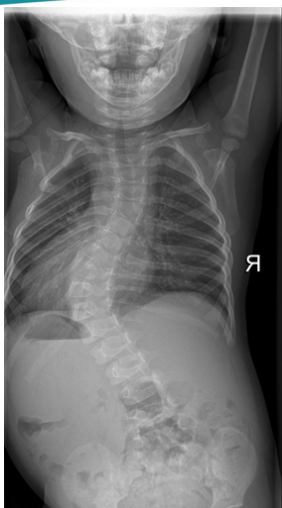
Mehta Casting



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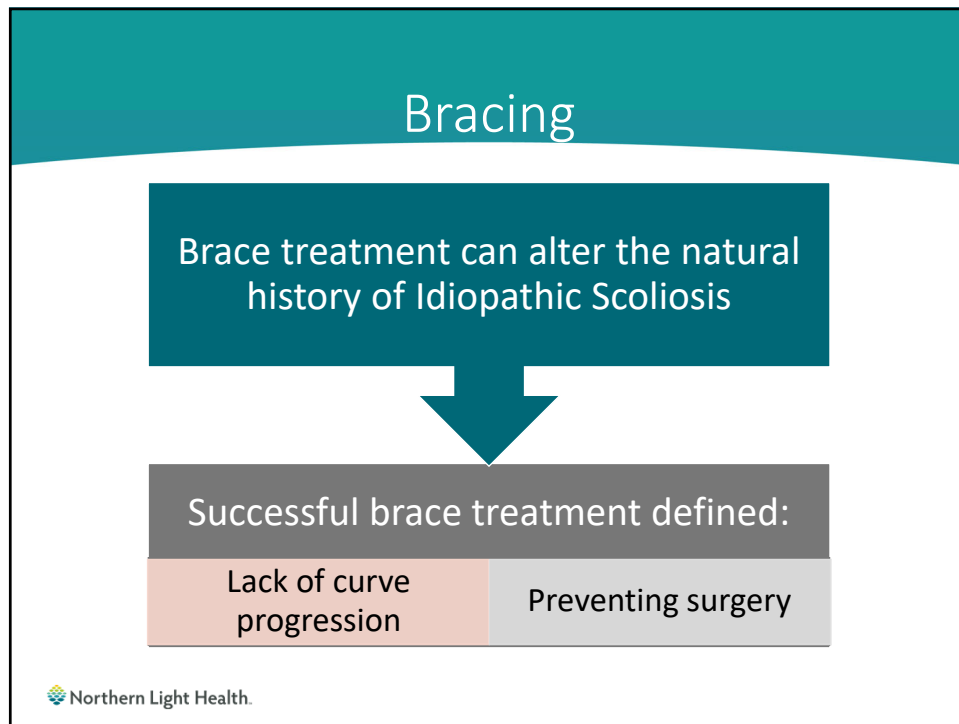
43

Mehta Casting Example

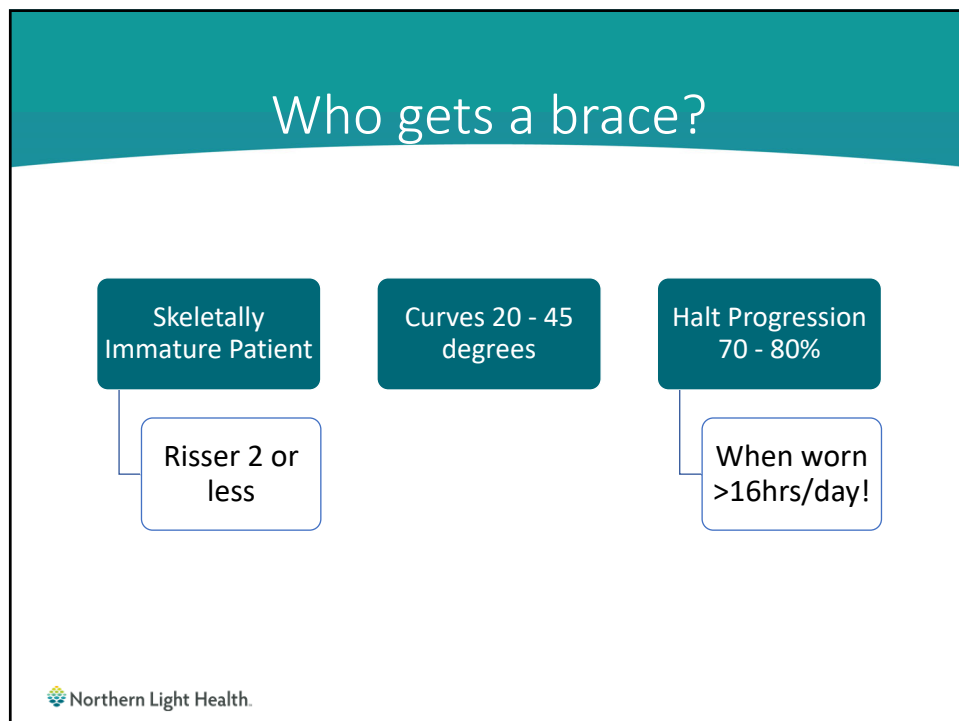


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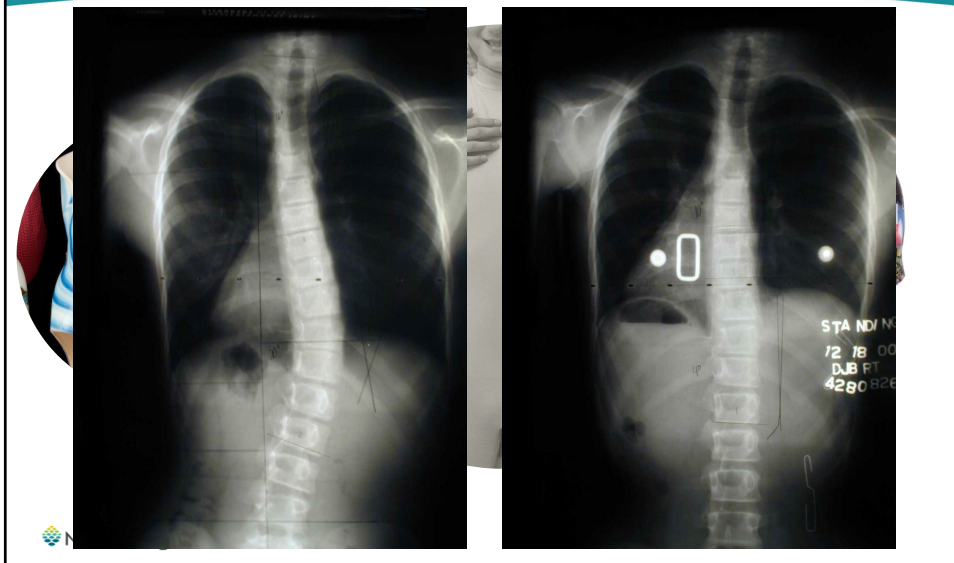


45



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Signs of a Good Brace



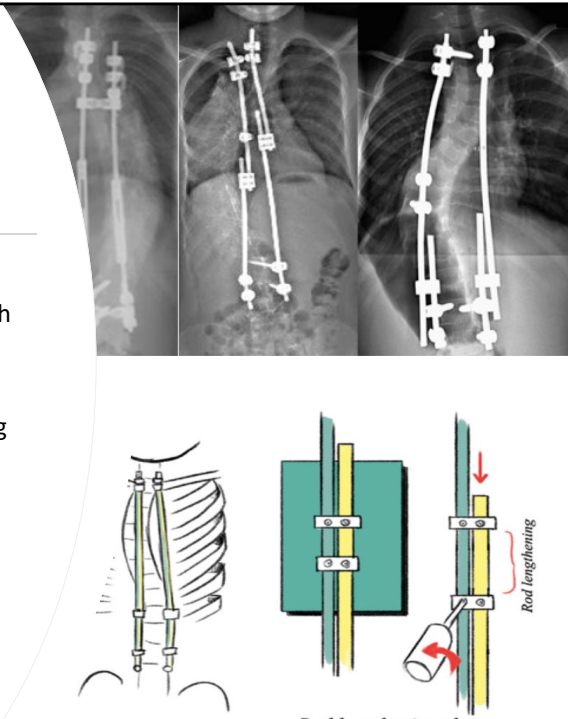
47

Surgery that allows continued growth...

48

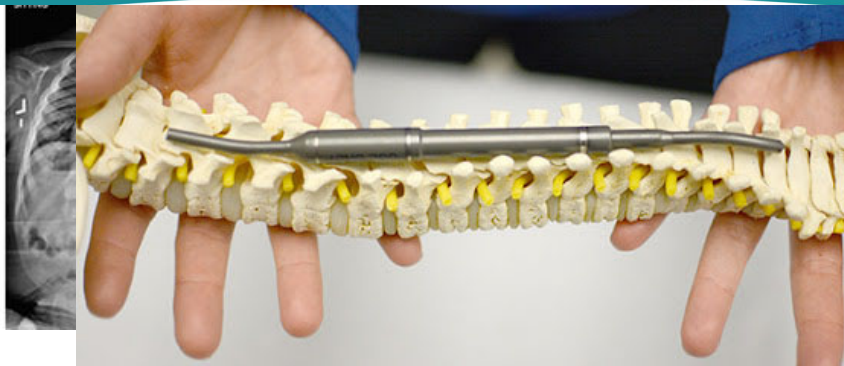
Traditional Growing Rods

- Correction of scoliosis while allowing for continued growth in early onset scoliosis
- Fear of fusing too early young and concern of pulmonary hypoplasia and resulting pulmonary disability
- Require lengthening in the operating room every 4-6 months



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MAGEC Rods



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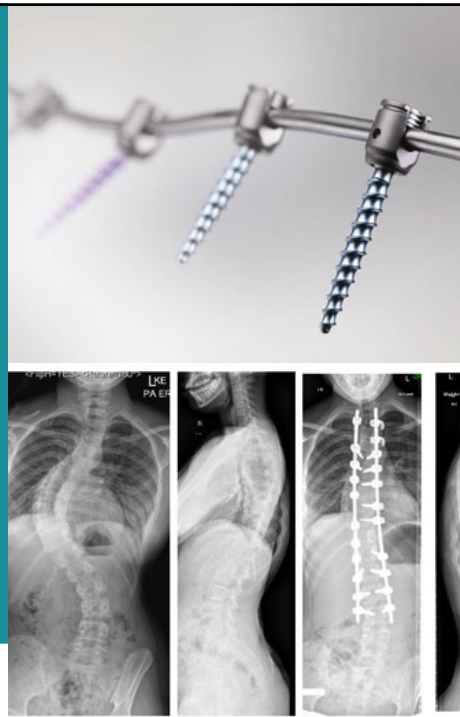
Definitive Treatment

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Gold Standard for Fusion...

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Posterior Spinal Instrumentation and Fusion

Reliable and powerful fusion
technique with excellent track record

Definitive Treatment for curves over
50 degrees

Complication rate in idiopathic cases
is 0.6-0.8%

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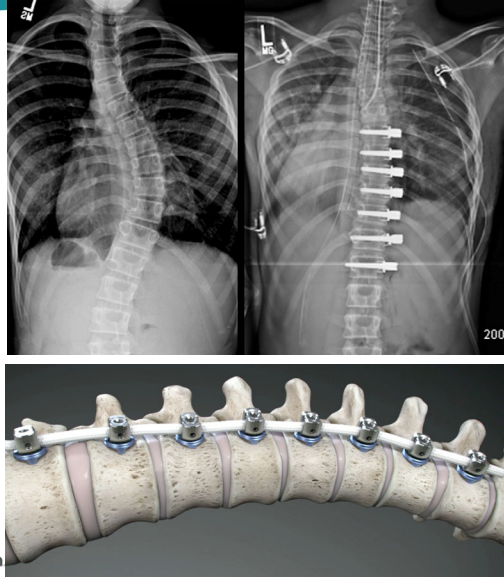
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New and Emerging Technologies

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Vertebral Body Tethering



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Vertebral Body Tethering

Non-fusion technique

- Theoretical Maintenance of spinal motion

Initially designed for flexible scoliosis

- Benefit likely for lumbar curves

High complication rate ~20%

- Failure of tether a concern

No Long-term Data (>5 year)

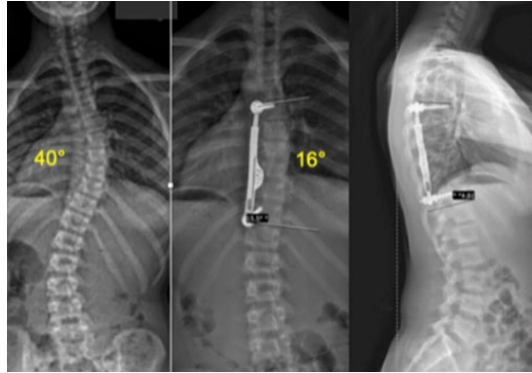
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Apifix Device



Apifix



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In Summary...

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DIAGNOSIS SUMMARY

History

- Age of occurrence
- *Painful Scoliosis or neurological symptoms are RED FLAGS*

Physical Exam

- *Look for asymmetry*
 - *Adams Forward Bend Test*
- *Neurologic exam*

Indications For MRI

Progressive Infantile or Juvenile Scoliosis

- *Scoliosis before 10 years of age*

Abnormal Physical Exam

Abnormal Neurologic Exam

Scoliosis Subtypes Summary

Early Onset Scoliosis

- *Infantile, Congenital, Juvenile*
 - Require MRI evaluation
- *Congenital Scoliosis*
 - VACTERL Association
 - ***DON'T FORGET TO CHECK THE KIDNEYS!***

Adolescent Scoliosis

- *Most Common*
- *Left sided curves rare*
 - Evaluate with MRI

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Treatment Summary for Idiopathic Scoliosis ONLY

Non-Operative Options

- Observation q3-4 months at first

Brace Curves

- 20° – 45°
- Skeletally Immature Patients
 - <Risser 2 or Sander <5

Curves over 50° = FUSION

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When to Refer?

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When to Refer?

- Curves over 10 degrees and patient under 10 years of age
- Curves over 15 degrees in skeletally immature patients
 - Risser 2 or less
- Scoliosis with any Red Flag
 - Abnormal neurological exam
 - Night time pain
- Syndromic, Infantile, Juvenile, Congenital or Neuromuscular Curves

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207-973-9570
WBassett@NorthernLight.org



Northern Light Pediatric Orthopedics
Welcomes
William Bassett, MD

Dr. Bassett is the only fellowship trained surgeon in the state performing complex pediatric orthopedic procedures. He provides subspecialized surgical care to patient throughout Maine. His goal is to help children retain and regain their childhood by enabling families to take part in activities they enjoy, while improving patients' overall quality of life.

Dr. Bassett specializes in treating:

- Benign bone tumors
- Club feet
- Foot reconstruction
- Fracture care
- Hip dysplasia
- Leg length discrepancy
- Lower extremity deformity
- Scoliosis
- Slipped capital femoral epiphysis

Northern Light.
Eastern Maine Medical Center

For more information or to schedule a referral:
Phone 207.973.8881 | Fax 207.973.8880

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