

# Pediatric Scoliosis & Back Pain

What's New in  
Medicine

Kennewick WA  
September 2019

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Assistant Professor  
UW Department of Orthopaedics



Disclosure:

Dr. Bauer is a consultant for Synthes Depuy.

# Outline

## Pediatric scoliosis:

- categories
- exam
- Evaluation: Op vs Non-op
- Basic Tx

## Back pain:

- categories
- exam

# Goals

- Be able to evaluate scoliosis and its cause/diagnosis
- Protocol driven pediatric Tx why/who surgery
- Be able to evaluate pediatric back pain (when to worry)







Scoliosis was just GOD's way of  
giving you natural  
SWAGGER.



somee cards  
user card



# Pediatric Scoliosis Categories

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## Idiopathic Scoliosis

Infantile

Juvenile

Adolescent





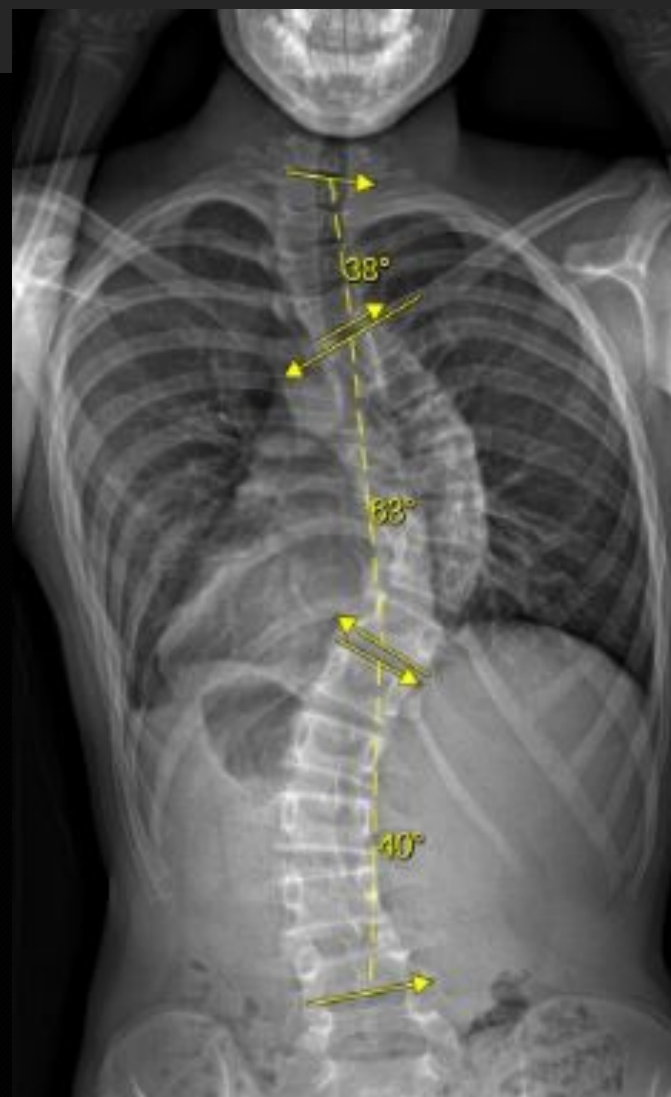
# Pediatric Scoliosis Categories

## Idiopathic Scoliosis

Infantile

Juvenile

Adolescent





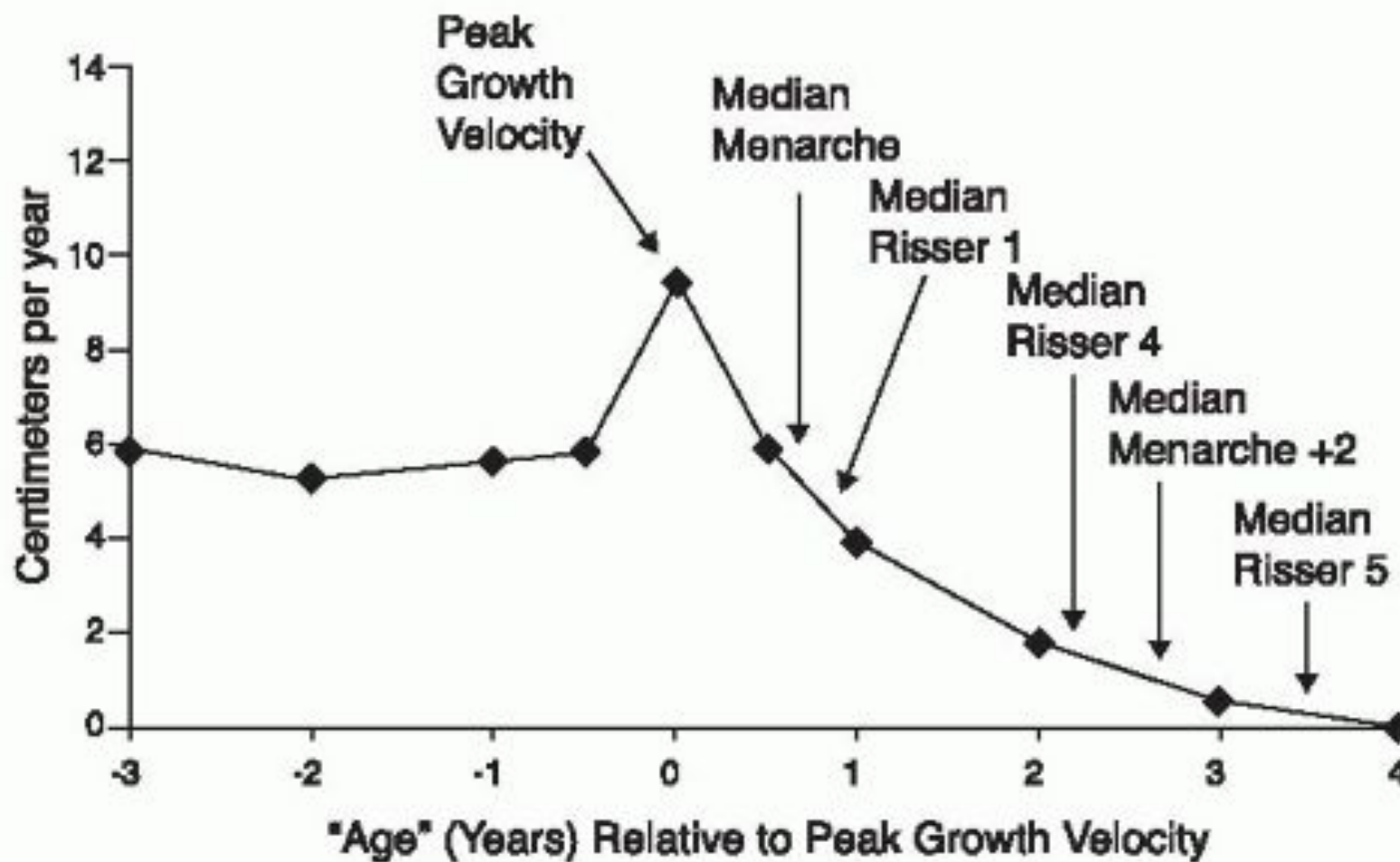
# Pediatric Scoliosis Categories

## Idiopathic Scoliosis

Infantile

Juvenile

Adolescent





# Pediatric Scoliosis Categories

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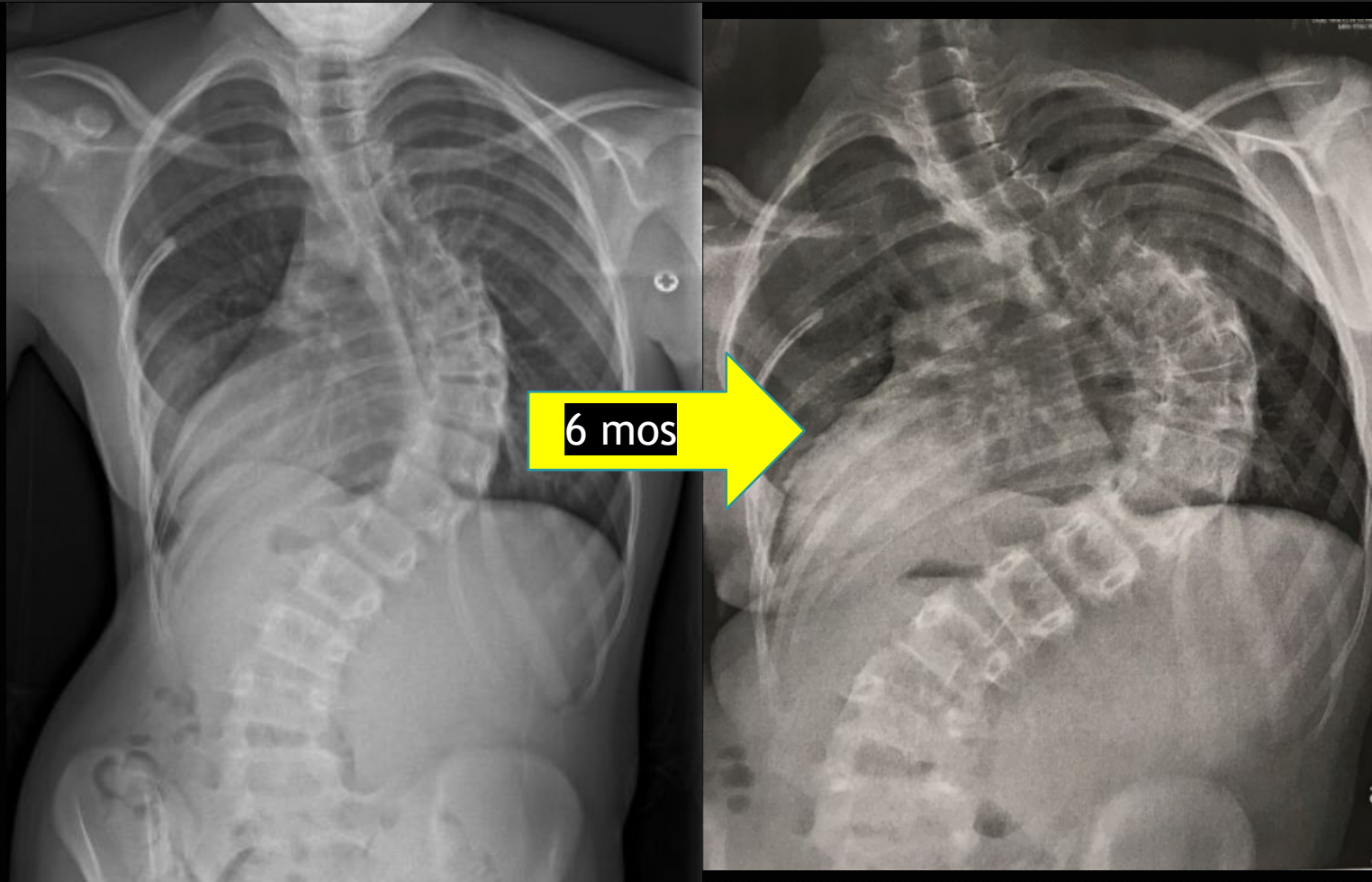
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## Idiopathic Scoliosis

Infantile

Juvenile

Adolescent





# Pediatric Scoliosis Categories

## Idiopathic Scoliosis

Infantile

Juvenile

Adolescent

## MRI/further evaluation:

- Abnormal neuro exam
- kyphosis
- (Curve >25 by 10yo)
  
- Relative:
  - Pain
  - Rapid progression
  - HA

# Pediatric Scoliosis/Kyphosis Categories

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Idiopathic  
Scoliosis

Infantile

Juvenile

Adolescent

Non-Idiopathic

Syndromic

Thoracogenic

Neuromuscular

Olisthetic

Congenital

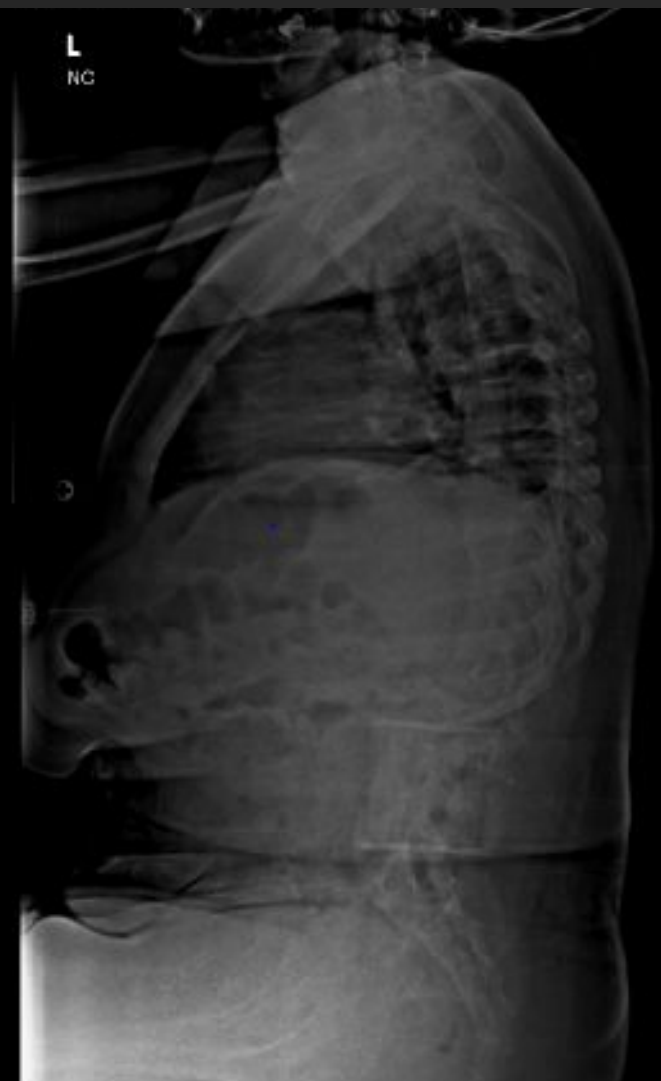
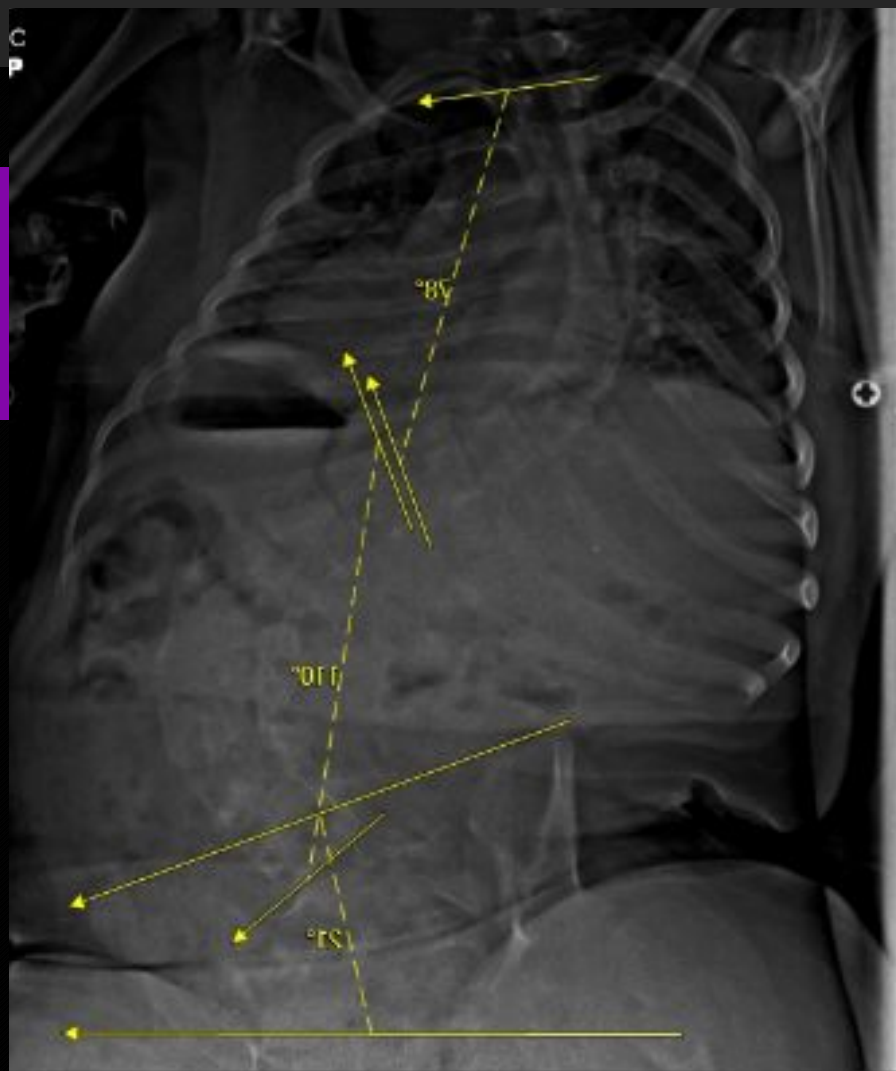
Scheuermann's Kyphosis





# Pediatric Scoliosis/Kyphosis Categories

Non-Idiopathic



# Pediatric Scoliosis/Kyphosis Categories

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Non-Idiopathic



# Pediatric Scoliosis/Kyphosis Categories

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Idiopathic  
Scoliosis

Non-Idiopathic

Early  
Onset

Infantile

Syndromic

Thoracogenic

Juvenile

Neuromuscular

Olisthetic

Adolescent

Congenital

Scheuermann's Kyphosis



# Pediatric Scoliosis/Kyphosis Categories

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Idiopathic  
Scoliosis

Non-Idiopathic

Early  
Onset

Infantile

Syndromic

Thoracogenic

Congenital

Juvenile

Neuromuscular

Olisthetic

Neuromuscular

Adolescent

Congenital

Syndromic

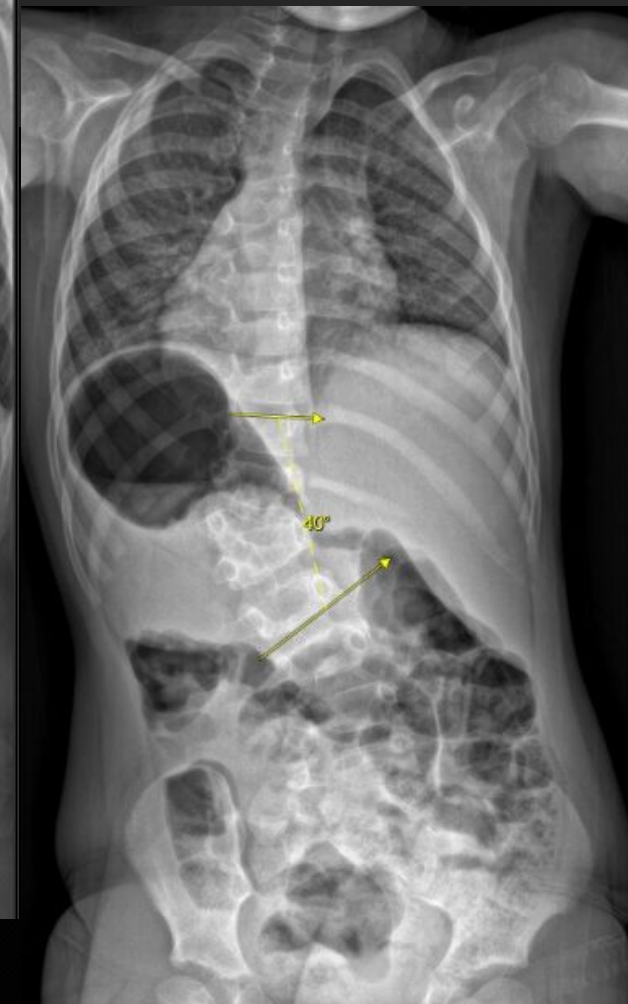
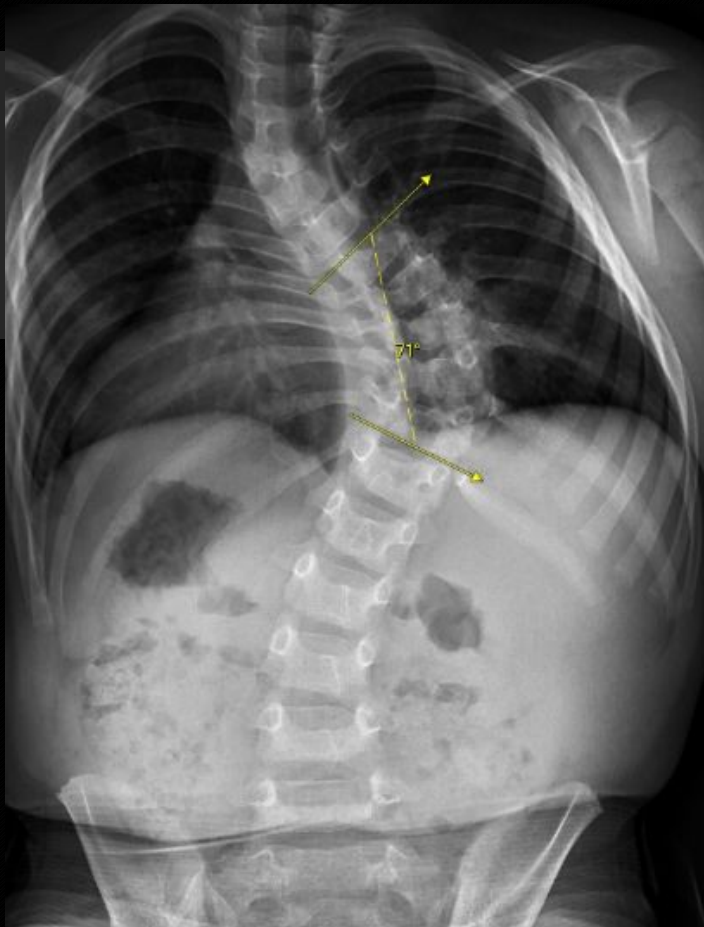
Scheuermann's Kyphosis

Idiopathic

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Early  
Onset

Congenital

Neuromuscular

Syndromic

Idiopathic

# Pediatric deformity goals:

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## Idiopathic Scoliosis

Stop progression  
before adulthood

Tx to avoid  
potential future  
resp symptoms

## Non-Idiop athic

Ensure diagnosis

Improve daily  
fnx/interaction

## Early Onset

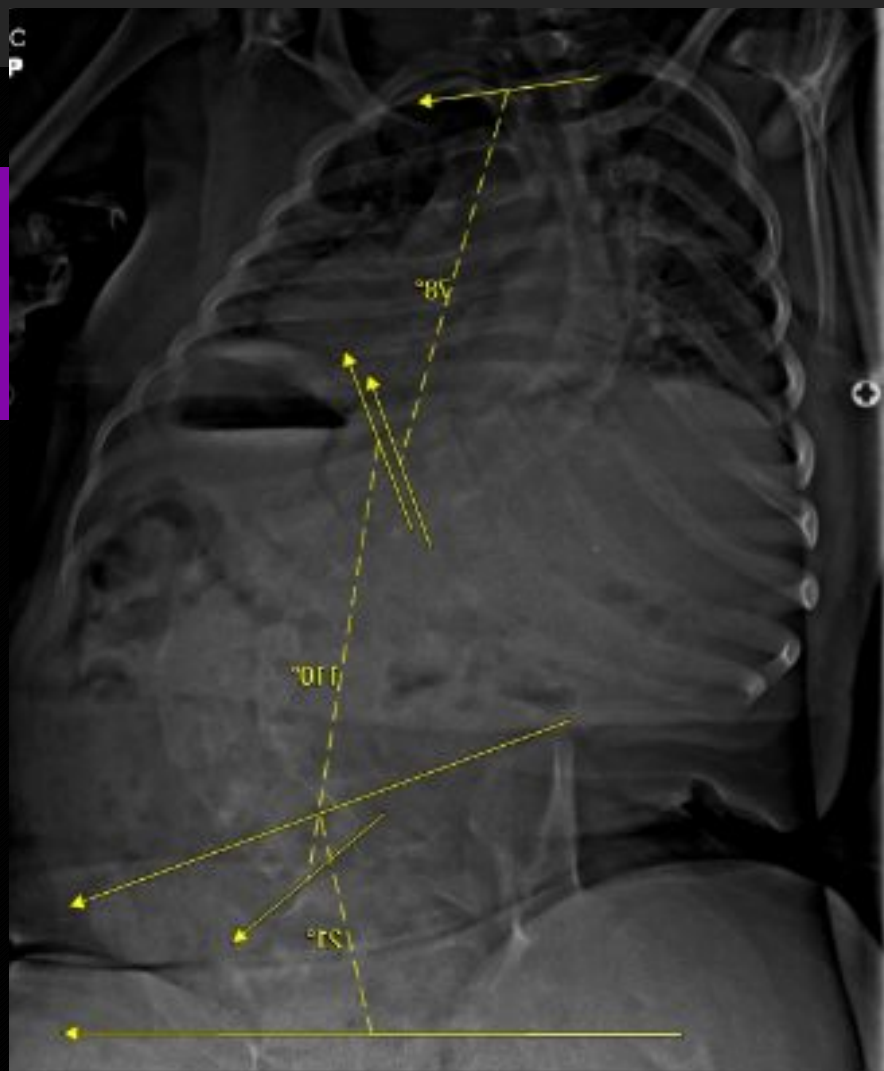
Preserve  
respiratory  
function





# Pediatric Scoliosis/Kyphosis Categories

Non-Idiopathic

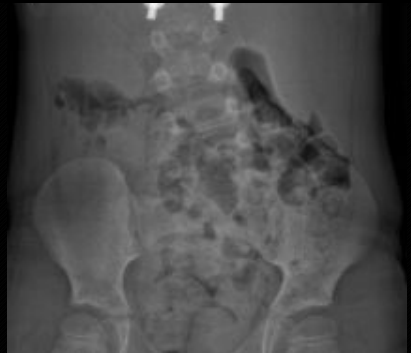
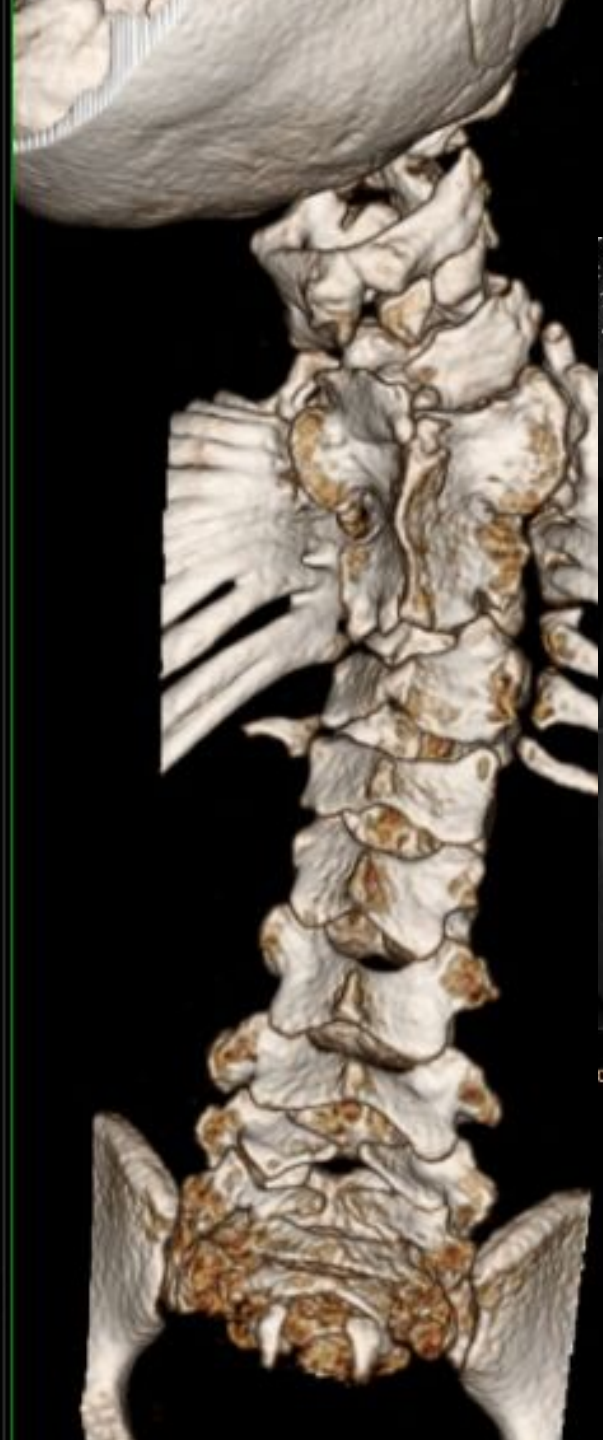


# Pediatric Scoliosis/Kyphosis Categories

Non-Idiopathic







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**Early Onset**

Preserve respiratory function

Past medical history of heart stuff and blah, blah, blah. Plan OR tonight.

--An orthopedic surgeon's H&P

som<sup>ee</sup>cards  
user card



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# Idiopathic: Non-op Tx Protocol

Risser

0, 1, 2

Tx

>25 brace

>45 op

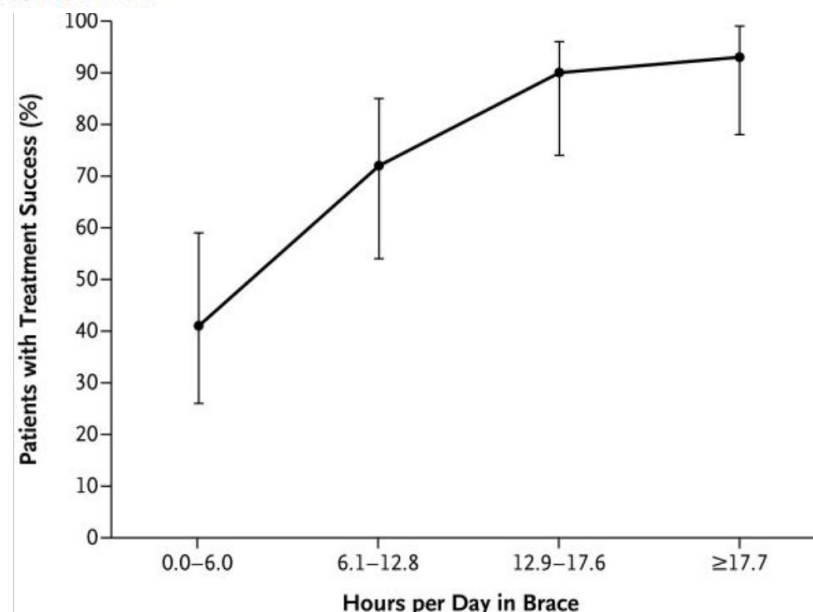
3,4,5

>50 op

## Effects of Bracing in Adolescents with Idiopathic Scoliosis

Stuart L. Weinstein, M.D., Lori A. Dolan, Ph.D., James G. Wright, M.D., M.P.H., and Matthew B. Dobbs, M.D.

N Engl J Med 2013;369:1512-21.





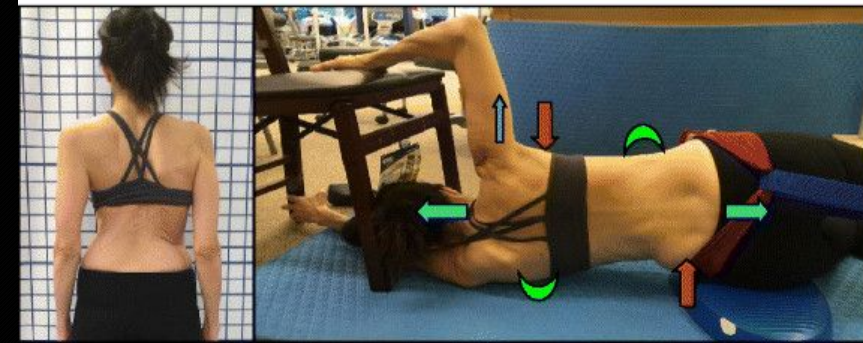
# Idiopathic: Non-op Tx Protocol



# Idiopathic: Non-op Tx Protocol

## Schroth PT

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# Idiopathic: Non-op Tx Protocol

## Schroth PT

PLoS One. 2016 Dec 29;11(12):e0168746. doi: 10.1371/journal.pone.0168746. eCollection 2016.

**Schroth Physical Therapy Clinical Specific Exercise Added to the Standard of Care Led to Better Control of Idiopathic Scoliosis: A Systematic Review and Meta-Analysis**  
Schreiber S<sup>1</sup>, Park JH<sup>1</sup>, Jeon HS<sup>2\*</sup>, Park HW<sup>3</sup>

Schreiber S<sup>1</sup>, Park JH<sup>1</sup>, Jeon HS<sup>2\*</sup>, Park HW<sup>3</sup>

Scoliosis Spinal Disord

**Schroth physical therapy added to the standard of care led to better control of idiopathic scoliosis: results from a preliminary study-SOSORT Award 2017 Winner.**

Schreiber S<sup>1</sup>, Park JH<sup>1</sup>, Jeon HS<sup>2\*</sup>, Park HW<sup>3</sup>

Scoliosis Spinal Disord

**Effective**

**scoliosis: results from a preliminary study-SOSORT Award 2017 Winner.**

Kwan KYH<sup>1</sup>, Cheng ACS<sup>2</sup>, Koh HY<sup>1</sup>, Chiu AYY<sup>2</sup>, Cheung KMC<sup>1</sup>.

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Online version at <http://www.minervamedica.it>

European Journal of Physical and Rehabilitation Medicine 2018 June;54(3):440-9  
DOI: 10.23736/S1973-9087.17.04461-6

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SYSTEMATIC REVIEW

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Effects of the Schroth exercise on idiopathic scoliosis:  
a meta-analysis

Joo-Hee PARK<sup>1</sup>, Hye-Seon JEON<sup>2\*</sup>, Ha-Won PARK<sup>3</sup>





# Idiopathic: Non-op Tx Protocol

Nobel Prize winning  
Low-dose X-ray detector



Proprietary software  
technology

Common dose from routine studies/exposure.

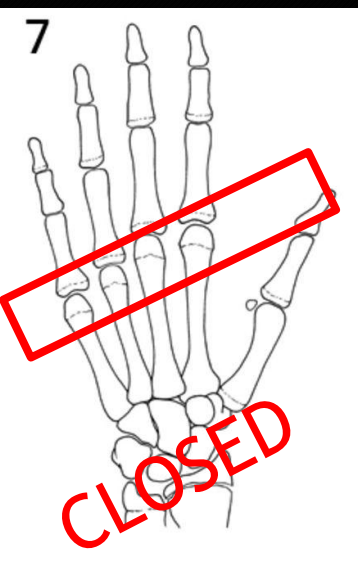
Exposure or examination [8,22,24,25]	Typical dose	Reported in literature
Accepted occupational exposure, mSv/year	20	
Accepted whole population exposure from industrial plants, mSv/year	1	
Annual US environmental background exposure, mSv/year	3	
Two-view chest, mSv	0.1	0.05–0.25
Two-view thoracic spine, mSv	0.5	
Two-view biplanar slot scan imaging, mSv	0.19	
Two-view biplanar microdose, mSv	0.01	
Two-view scoliosis film, mSv	0.51	
AP pelvis, mSv	0.6	0.2–1.2
Abdominal film, mSv	0.7	
Low-dose intraoperative CT (80 kV, 20 mA, 80 mAs) protocol, mSv	0.65	
Shoulder, mSv	0.01	
Manufacturer setting intraoperative CT, mSv	4.65	
CT spine, mSv	6	1.5–10
Bone scan, mSv	6.3	
CT abdomen, mSv	8	3.5–25



# Idiopathic: Non-op Tx Protocol

## Skeletally mature

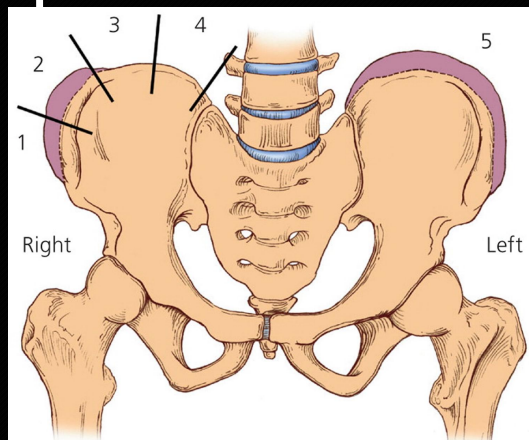
- Sanders 7
- Risser 4 (F), 5 (M)
- No height growth
- 2yr post menarchal



+

## Controlled curve

- <40ish
- No progression



# Idiopathic: Why op?

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## Idiopathic scoliosis: long-term follow-up and prognosis in untreated patients.

Weinstein, S L; Zavala, D C; Ponseti, I V  
JBJS. 63(5):702-712. Jun 1981.

J Bone Joint Surg Am. 1983 Apr;65(4):447-55.

## Curve progression in idiopathic scoliosis.

Weinstein SL, Ponseti IV.

## Idiopathic Scoliosis Natural History

STUART L. WEINSTEIN, MD\*

## Health and Function of Patients With Untreated Idiopathic Scoliosis A 50-Year Natural History Study

Stuart L. Weinstein, MD

Lori A. Dolan, MA

Kevin F. Spratt, PhD

Kirk K. Peterson, MD

Mark J. Spoonamore, MD

Ignacio V. Ponseti, MD



# Idiopathic: Operate (?)

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Spine  
Deformity

[www.spine-deformity.org](http://www.spine-deformity.org)



Spine Deformity 7 (2019) 84–92

## Surgery for the Adolescent Idiopathic Scoliosis Patients After Skeletal Maturity: Early Versus Late Surgery

Baron S. Lonner, MD<sup>a,\*</sup>, Yuan Ren, PhD<sup>a</sup>, Shay Bess, MD<sup>b</sup>, Michael Kelly, MD<sup>c</sup>, Han Jo Kim, MD<sup>d</sup>, Burt Yaszay, MD<sup>e</sup>, Virginie Lafage, PhD<sup>d</sup>, Michelle Marks, PT, MA<sup>e</sup>, Firoz Miyanji, MD<sup>f</sup>, Christopher I. Shaffrey, MD<sup>g</sup>, Peter O. Newton, MD<sup>e</sup>

Matched cohort: 15yo vs 43yo average

- 5% vs 25% major complication rate
- 0% vs 36% fused to pelvis
- Younger: 3.5 fewer levels fused, shorter op time

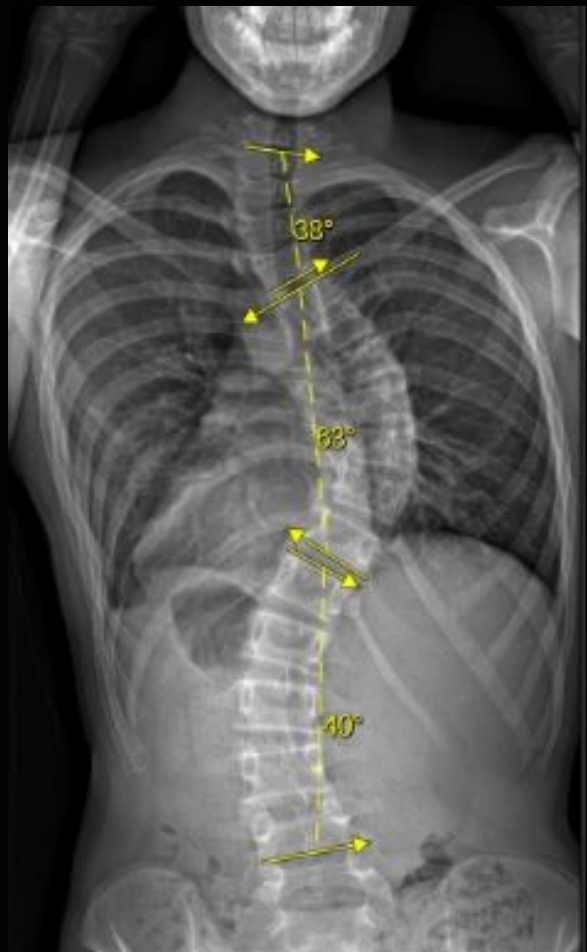


# Idiopathic: Operative Success

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# Idiopathic: Operative Success

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Spine Deformity 4 (2016) 288–295

www.spine-deformity.org

J Child Orthop (2014) 8:257–263  
DOI 10.1007/s11832-014-0587-y

ORIGINAL CLINICAL ARTICLE

A Rapid Recovery Pathway for Adolescent Idiopathic Scoliosis  
Impro

Use of a Novel Pathway for Early Discharge  
Associated With a 48% Shorter Length of  
Posterior Spinal Fusion for Adolescent

**Clinical and economic implications of early discharge following  
posterior spinal fusion for adolescent idiopathic scoliosis**

SPINE Volume 42, Number 9, pp E547–E554  
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Spine

Spine

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DEFORMITY

DEFORMITY

Accelerated Discharge Protocol for  
Spinal Fusion Patients With Adolescent  
Idiopathic Scoliosis Decreases Hospital  
Postoperative Charges 22%

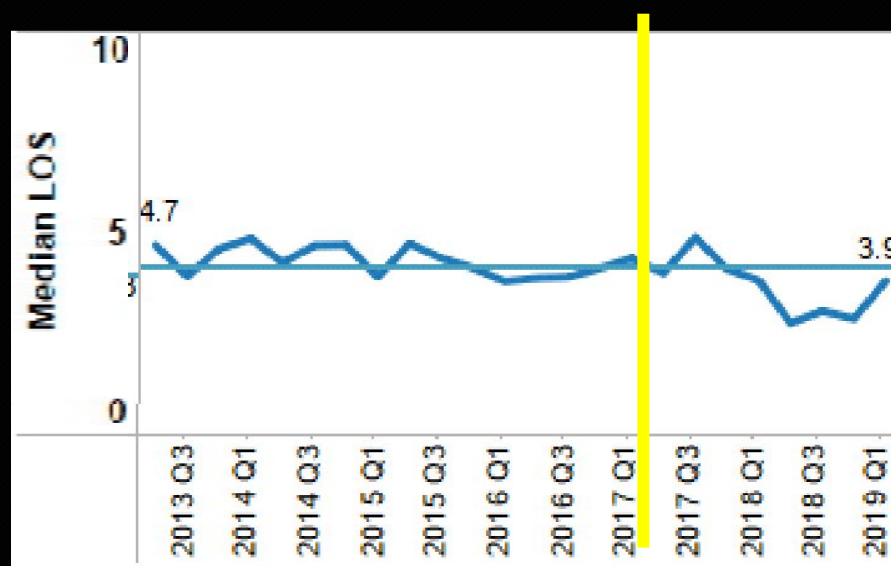
Development of Consensus-Based Best Practice  
Guidelines for Postoperative Care Following  
Posterior Spinal Fusion for Adolescent  
Idiopathic Scoliosis

Austin E. Sanders, BA,\* Lindsay M. Andras, MD,\* Ted Sousa, MD,\* Cathy K  
Giovanni Cucchiaro, MD,† and David L. Skaggs, MD, MMM\*

Nicholas D. Fletcher, MD,\* Michael P. Glotzbecker, MD,† Michelle Marks, PT, MA,‡,§  
and Peter O. Newton, MD¶, Harms Study Group

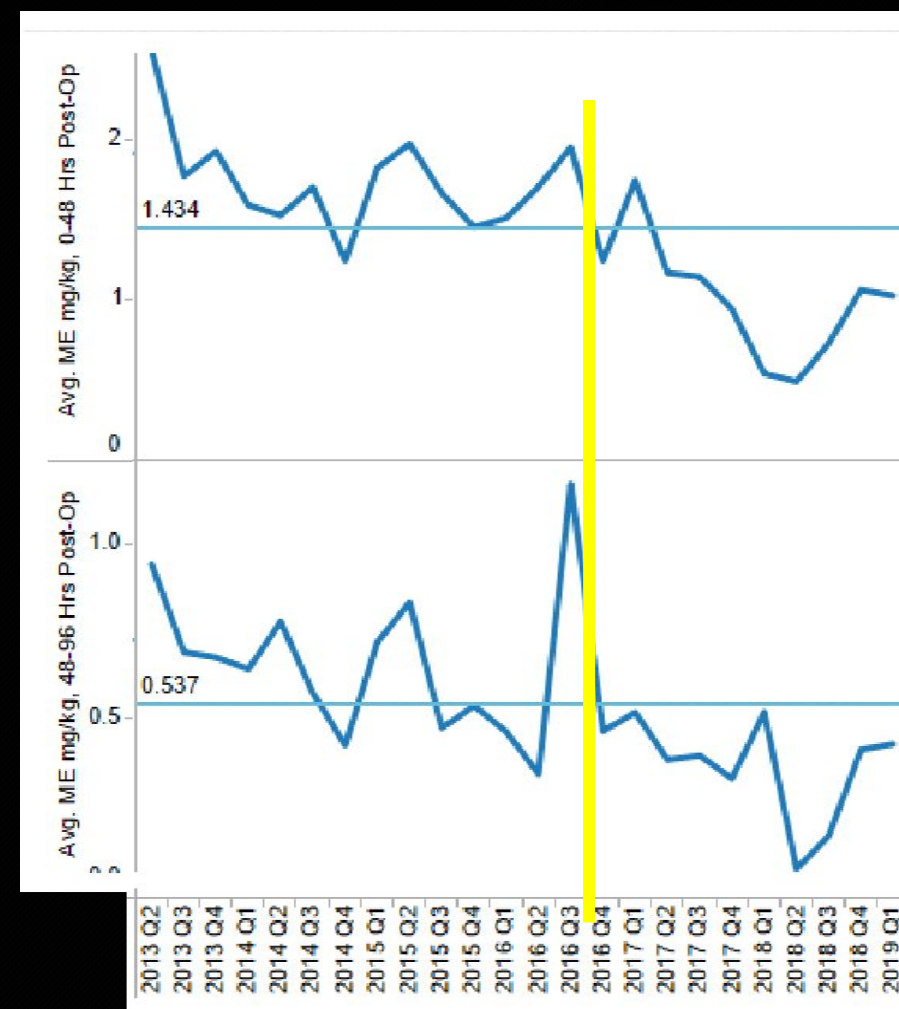
# Idiopathic: Operative Success

Median  
LOS:



Morphine dose  
equivalents:

0-48h



48-96h



# Idiopathic: Operative Success

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## Pediatric Spine Team:

- Spine-specific surgeons
- Spine-specific PA, RN
- Spine-specific anesthesia pre-op clinic clearance
- Spine-specific anesthesia surgery team
- Spine-specific post-op pain service
- Spine-specific protocols:
  - PT, RN, diet, activity, medications

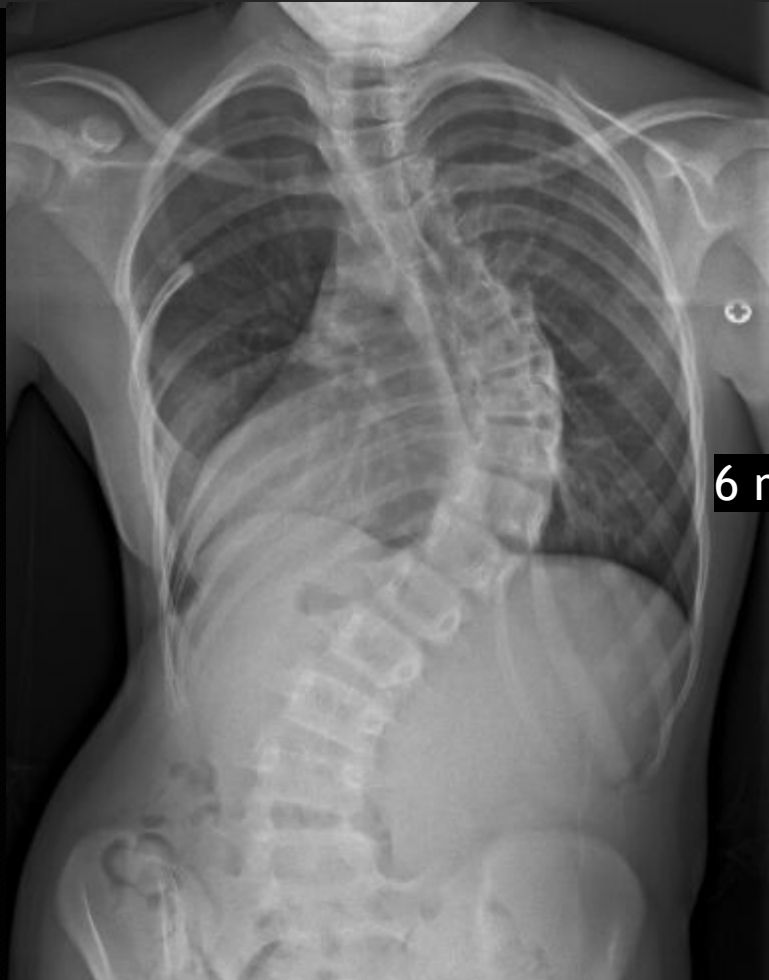


# Idiopathic: Operative Success

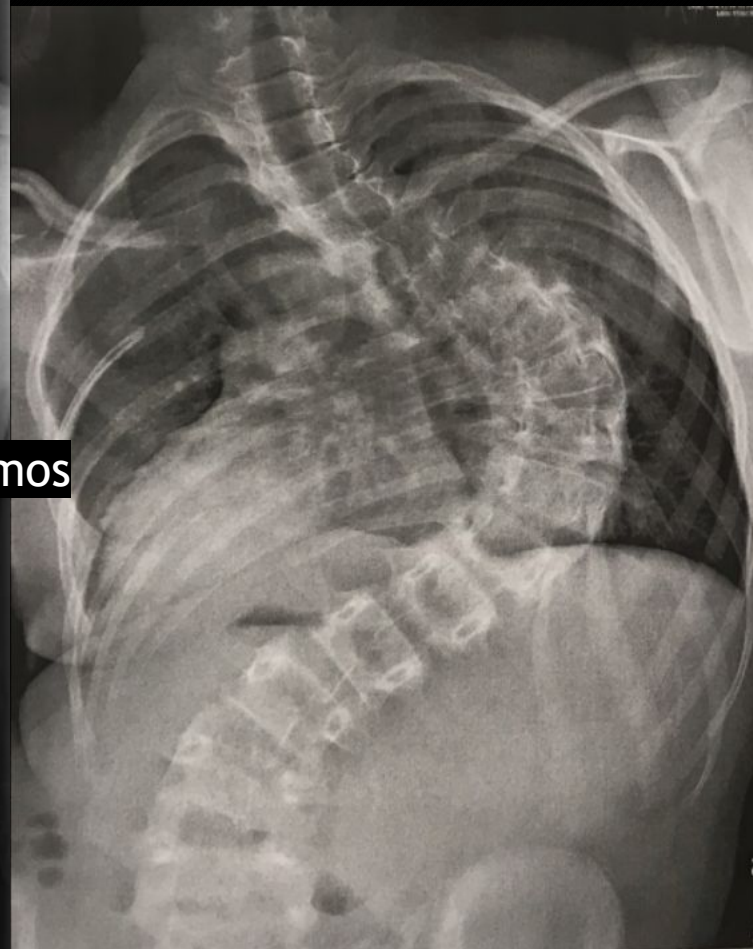
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6 mos

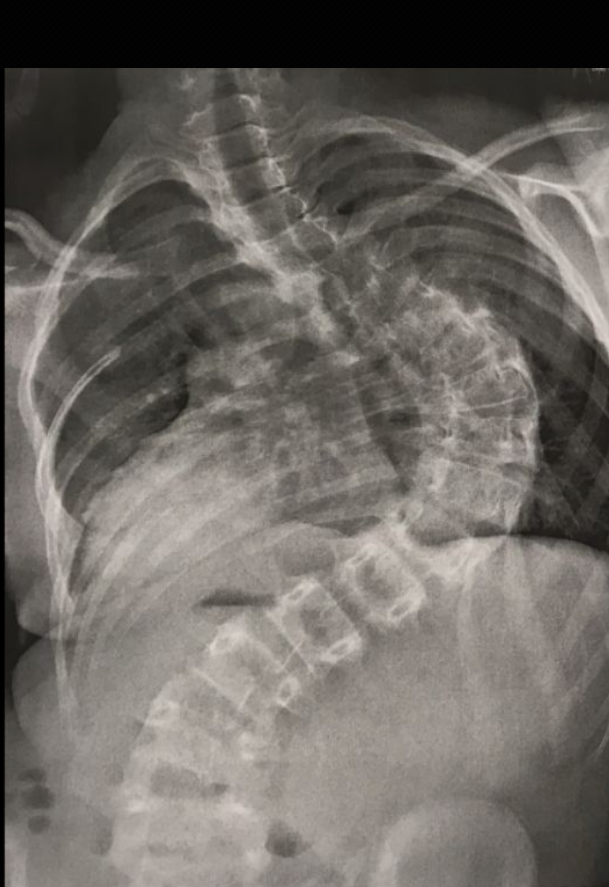


# Idiopathic: Operative Success

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**TELL SOMEONE YOU HAVE SCOLIOSIS NOBODY  
BATS AN EYE**



**SHOW SOMEONE YOUR X-RAYS AND  
EVERYONE LOSES THEIR MINDS**



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# Back PAIN: Brief Primer

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## Where?

- Low back?
- Paraspinal vs midline?
- Periscapular?
- Peri-curve?

**LEGS AND ARMS?**

# Back PAIN: Brief Primer

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## Quality?

- Neuropathic/radicular?
- Localizable, sharp?
- Dull, ache, generalized?
- Spasm?

# Back PAIN: Brief Primer

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## Exam?

- Tenderness?
- Pain on extension only?
- Abnormal motion?
- Straight leg raise?
- Weakness?
- DERMATOMAL numbness/tingling/pain



# Back PAIN: Brief Primer

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## Imaging?

- True radicular □ MRI
- Spondylolisthesis/lysis on plain xray □ non-op 1<sup>st</sup>  
.....CT. NOT oblique lumbar xrays. (not) SPECT.
- Acute fracture □ CT

# Back PAIN: Brief Primer

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## Treatment?

- Non-op
- Non-op
- Non-op

# Back PAIN: Brief Primer

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## Treatment?

- PT: hamstring, core, back  
spondy ACUTE - shutdown 2-6wk  
spondy CHRONIC - start right away
- Meds: NSAIDs, gabapentin
- OTHER: acupuncture, massage, BIOFEEDBACK
- Brace: corset/LSO



# Back PAIN: Case 1 - KP

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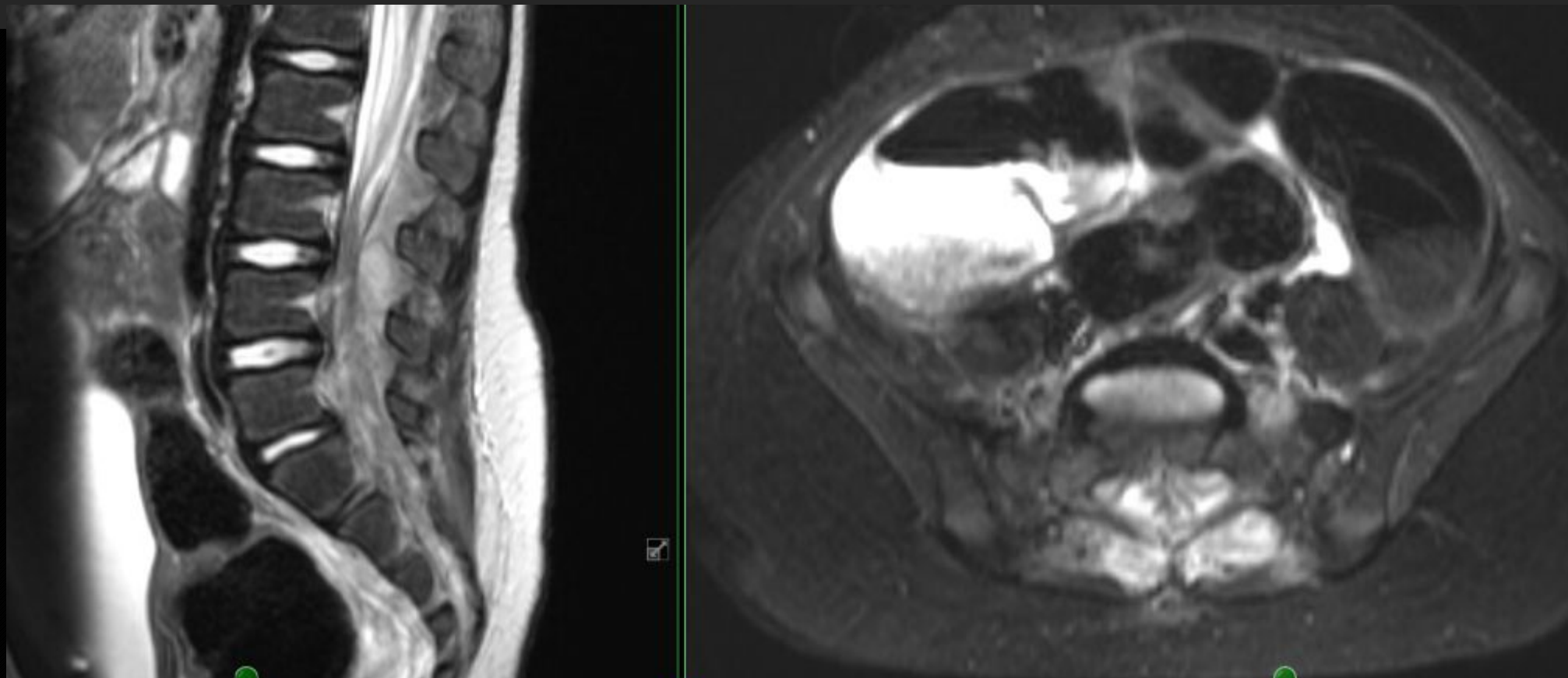


# Back PAIN: Case 2 - SC

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