

# Vertebral Body Stapling

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# History of Vertebral Body Stapling

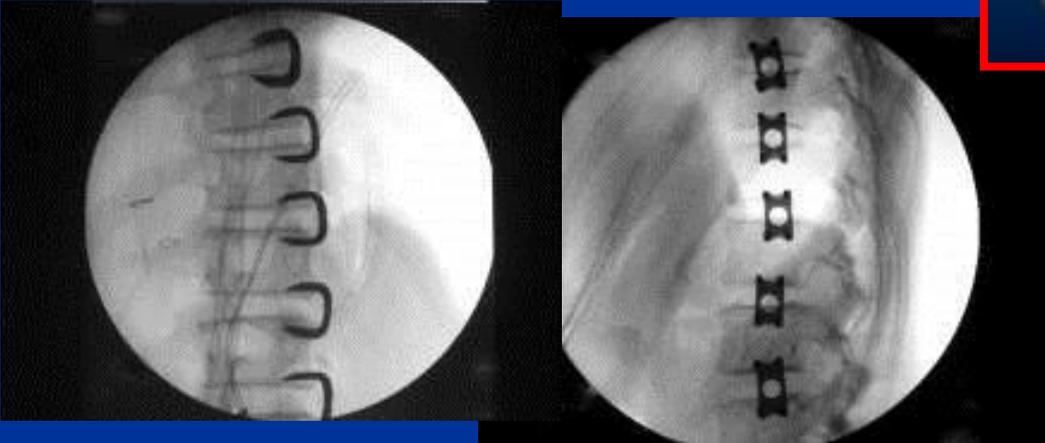
- Convex growth arrest
- Nachlas & Borden, 1951
- Smith, 1954



Dr Crawford's Adult Patient



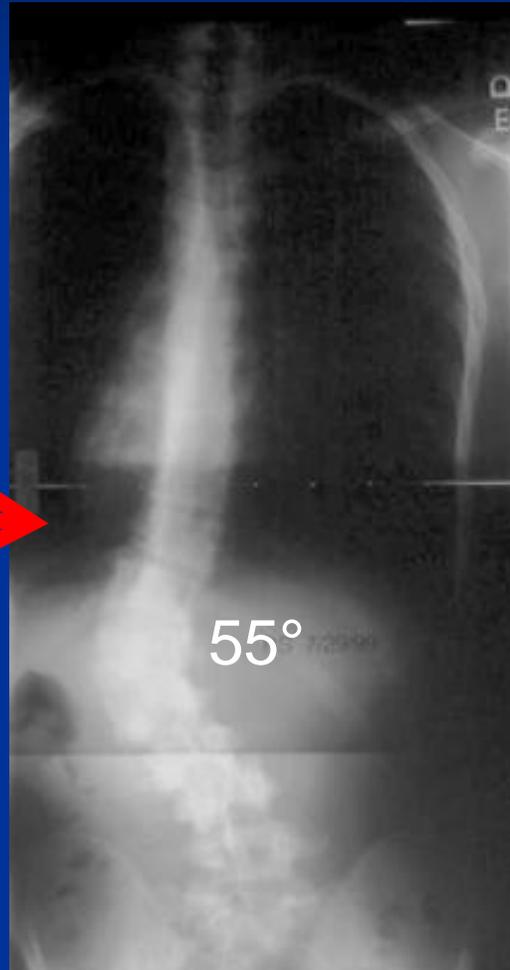
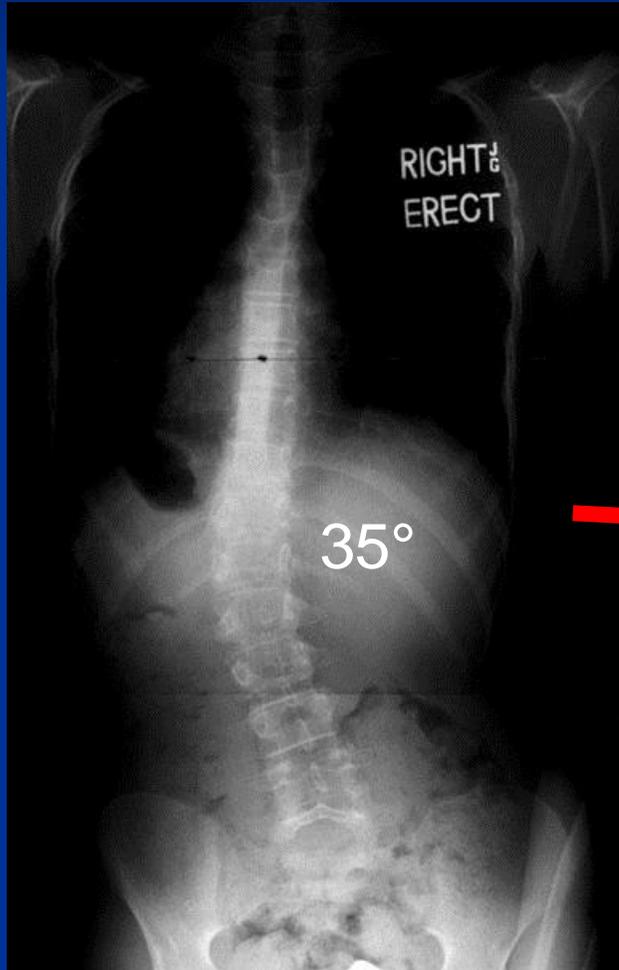
Video



# 10 yo girl with IS, onset at age 8.5 years, progressing despite bracing



# Natural history suggests she would go onto a fusion



# Progression Risk of Idiopathic Juvenile Scoliosis During Pubertal Growth

YP Charles, A Dimeglio *et al* Spine 2006;31:1933–42

- Patients with JIS and curves  $> 30^{\circ}$  treated with bracing
  - 100% risk for curve progression needing fusion
- Curves ranging from 21 to  $30^{\circ}$ 
  - 75% risk

# 8 yo girl

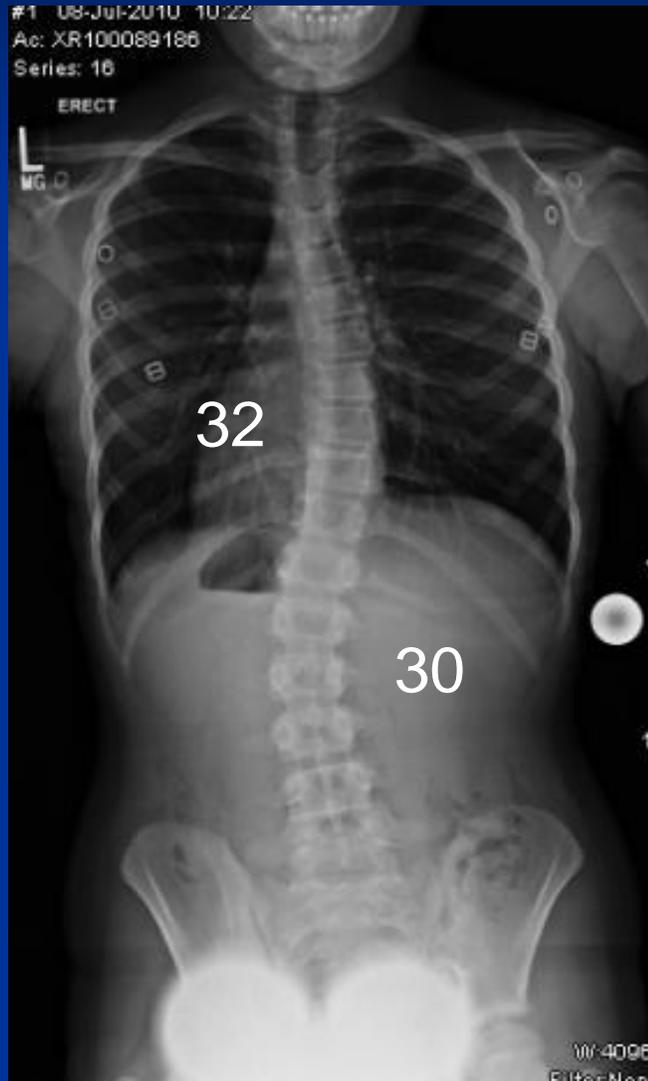


1<sup>st</sup> erect

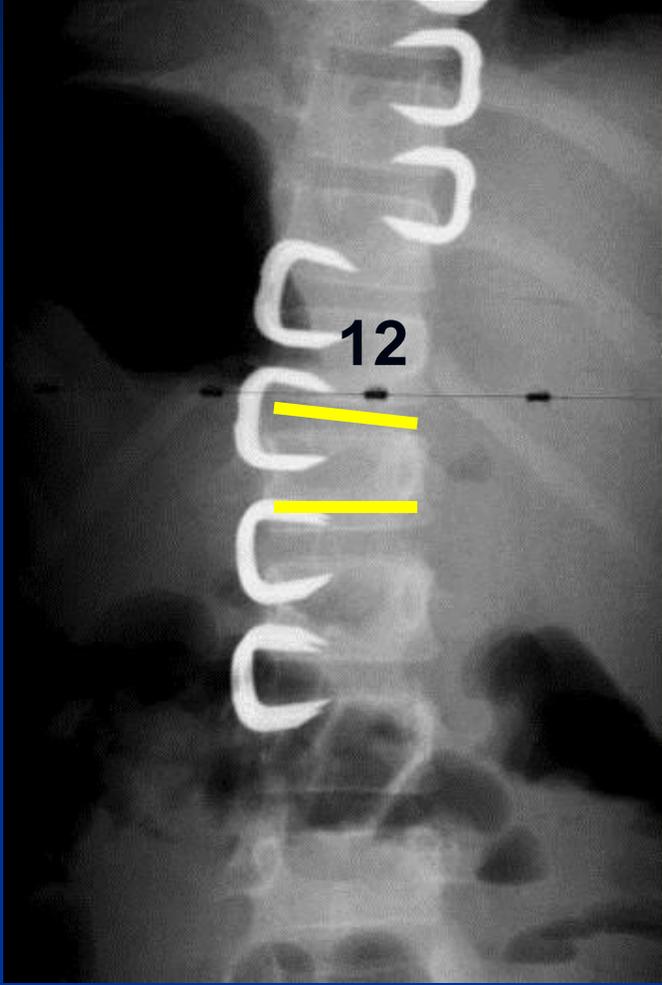


4 year post-op

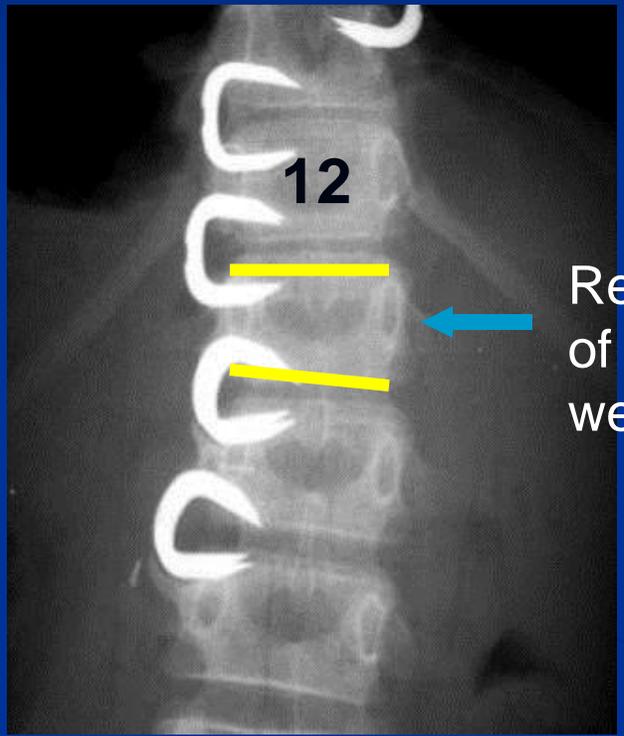
# Case Example: 10 yo female, R=0,S=3



# Growth Modulation



2002



2005

Reversing  
of the  
wedging

Cahill PJ et al: Factors predictive of outcomes in vertebral body stapling for idiopathic scoliosis. Spine Deform 6(1):28-37, Jan. 2018.

- 63 patients met our inclusion criteria
  - Diagnosis of idiopathic scoliosis
  - Preoperative curve
    - 20-35° for thoracic curves
    - 20-45° for lumbar curves
  - Preoperative Risser sign of 0 - 1
  - Total of 81 stapled curves
    - 43 thoracic, 38 lumbar
  - Mean preoperative Cobb angle
    - Thoracic curves: 29.1° (range 25-35)
    - Lumbar curves: 30.5° (range 25-45)
  - Mean length of follow-up was 3.4 yrs

# Follow-up to Skeletal Maturity

## Defined by Having a Risser Score $\geq 4$

- The success rate for mature thoracic curves was 71% (12/17)
- The success rate for mature TL / lumbar curves at most recent follow-up was 89% (17/19)

# VBS vs. Bracing for Idiopathic Scoliosis

Cuddihy L et al: Vertebral body stapling vs. bracing for patients with high-risk moderate idiopathic scoliosis.

Biomed Res Int, Article ID 438452, Volume 2015

- Inclusion criteria
  - Idiopathic scoliosis
  - Coronal curve magnitude of 25 to 44°
  - Risser 0 or 1
  - Minimum two-year follow up
  - Matched for age at initiation of treatment
- **VBS** database (2002-2007)
  - 43 patients, 55 curves
- **Bracing**: Göteborg scoliosis database (1968-1994)
  - 53 patients, 70 curves

# Subanalysis of Groups When Matched for Age, avg. 10.5yrs

VBS: 55 curves, Bracing: 70 curves

	No change/ improvement (%)	Progression (%)	P value (Fisher's exact test)
<b>Thoracic curves 25-34°</b> VBS (N=25) Bracing (N=36)	80 58	20 42	0.09
<b>Thoracic curves 35-44°</b> VBS (N=11) Bracing (N=13)	18 46	82 54	0.21
<b>Lumbar curves 25-34°</b> VBS (N=13) Bracing (N=18)	77 56	23 44	0.27
<b>Lumbar curves 35-44°</b> VBS (N=6) Bracing (N=3)	67 0	33 100	0.16

# Bad Results of Stapling in the Current VBS Literature

- O'Leary *et al*, Spine 36:1579–83, 2011
  - 11 patients (myelodysplasia, congenital scoliosis, juvenile scoliosis, infantile scoliosis, Marfan's, paralytic scoliosis, and neuromuscular scoliosis) showed > 50% failure. Average pre-op curves were 68°.
    - This is a patient population with extreme curves, different from our cohort.
- Ohlin *et al*, SRS 2012
  - 9 immature patients with moderate thoracic AIS with mean pre-op Cobb 38° (2 pts <35°, 7 pts ≥ 35°) underwent endoscopic vertebral stapling. 7/9 pts with curves ≥ 35° progressed to fusion.
    - The 1<sup>st</sup> erect curve averaged 34° in this cohort of patients

**VBS is for flexible, moderate scoliosis, not for severe scoliosis or large curves that failed bracing**

# Fusion After Failed Stapling



No spontaneous fusion

# Failure and Success in Vertebral Body Stapling

Joshua Pahys, Amer Samdani,  
Michael Auriemma, Elias Dakwar,  
Randal Betz, Patrick Cahill

21<sup>st</sup> International Meeting on Advanced  
Spine Techniques, Valencia Spain,  
July 2014

# Current Practice Brace vs. Staples



# Growth Modulation with Staples: Consider for Tether?

- Some patients with bone overgrowth on staples
  - Not common
- Some patients with hyperkyphosis



For lumbar :  
small open incision  
or XLIF transpsoas  
approach

