

# THE SHILLA PROCEDURE

## A Spinal Growth Guidance System

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# Spinal Deformities in Children

- Types of Solutions

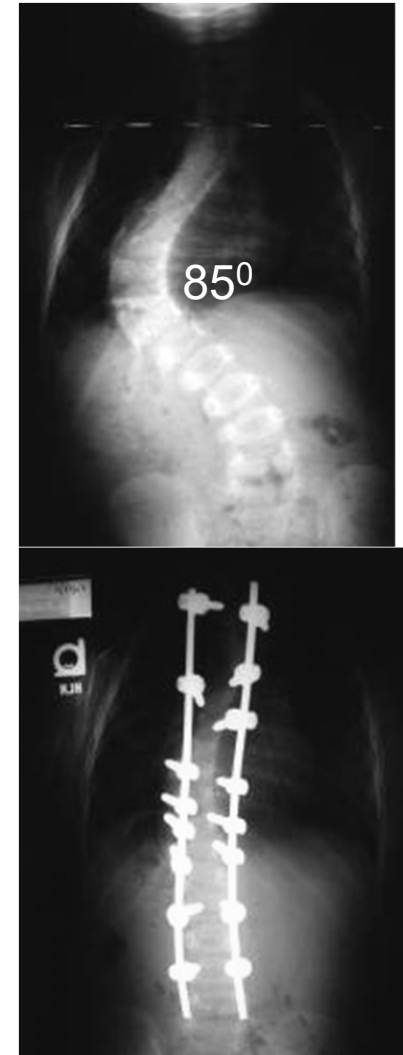
- Correction/Fusion - - - - -
- Convex tethering/partial fusion - - -
- “Growing rods” - - - - -  
growth accommodating

- Problems

- Loss of growth
- Partial correction/  
partial growth loss
- Repeat trips to OR/  
goal is fusion

# Shilla Procedure

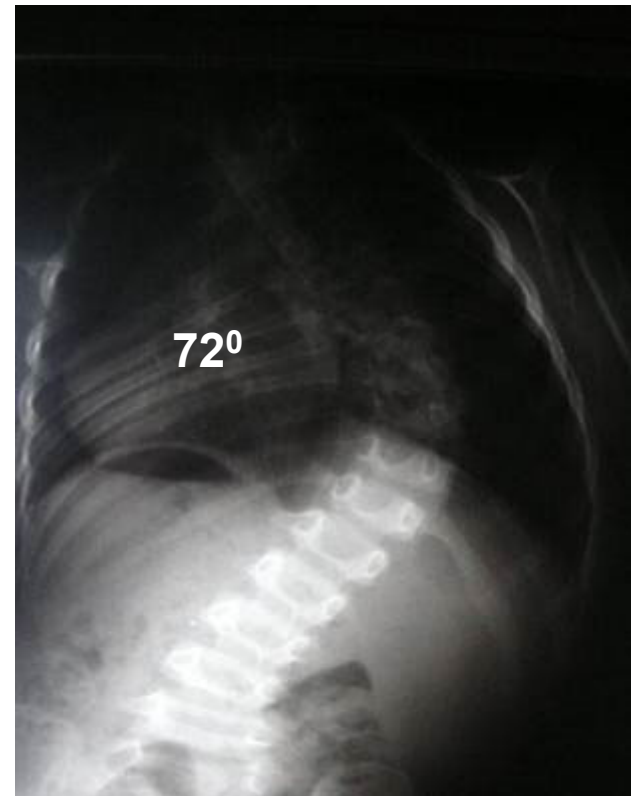
- Growth is encouraged and guided
- Corrects the 3 D spinal deformities
  - Fuses apex only
- Ultimate goal is spinal motion
  - Rod removal at maturity
  - Facet preservation



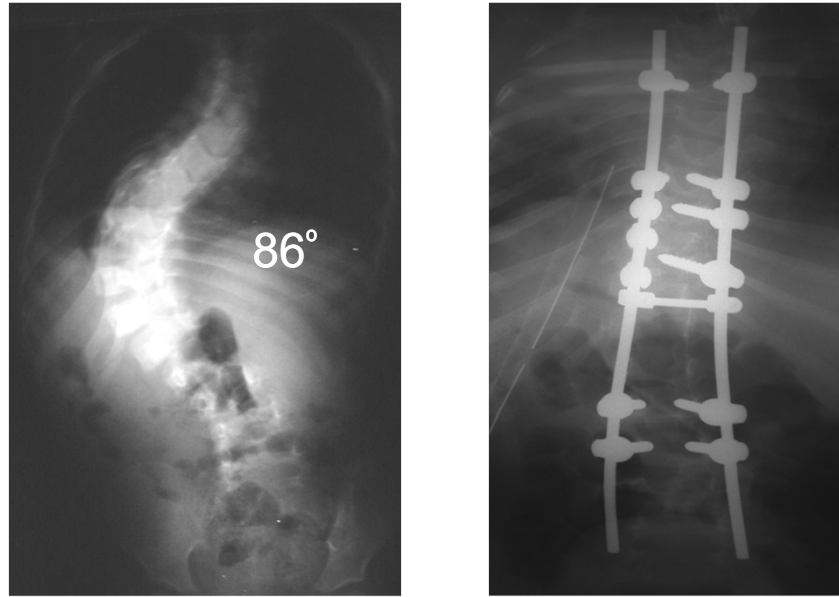
# Scoliosis

- Infantile and Juvenile
  - Multiple types

\*Not inclusive of chest wall deformities



# Shilla Procedure:



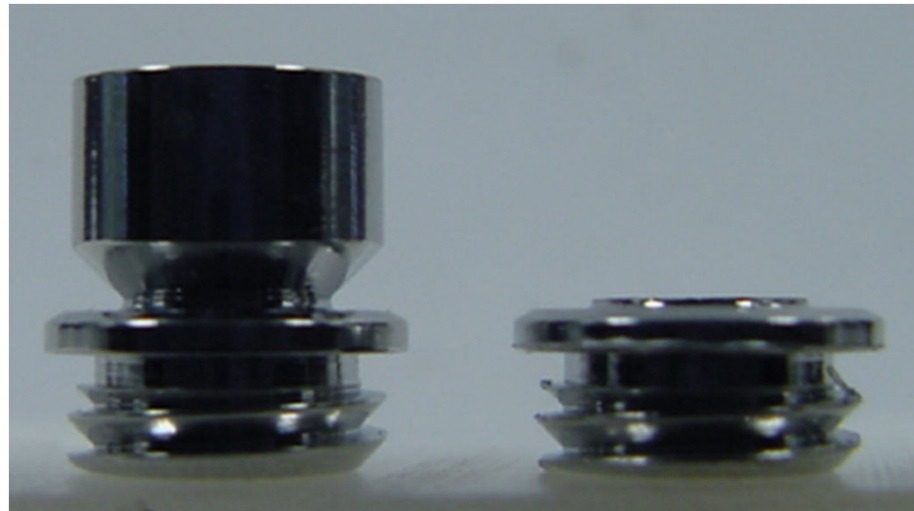
- Correction focused at apex
  - Fixed head pedicle screws
    - derotate spine
    - fix to rod
  - Apex fused – over 2-4 levels
- Growth guidance screws at ends of curve
  - Screws slide along rods with growth

# Method

- Growth guidance screws
  - Fix to bone; not to rod
  - Capture the rod but allow it to slide
  - Multiple planes of screw motion decrease stress on bone fixation



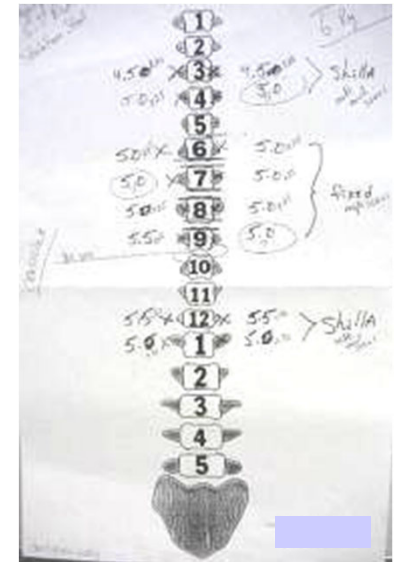
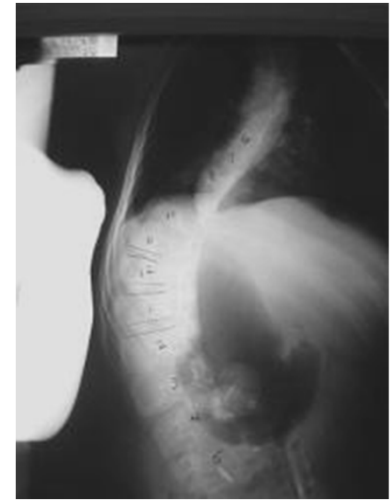
Polyaxial Screw



Snap Off Fixation Plug

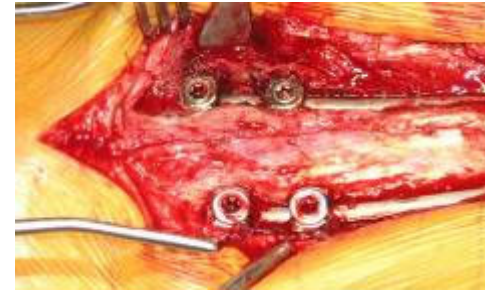
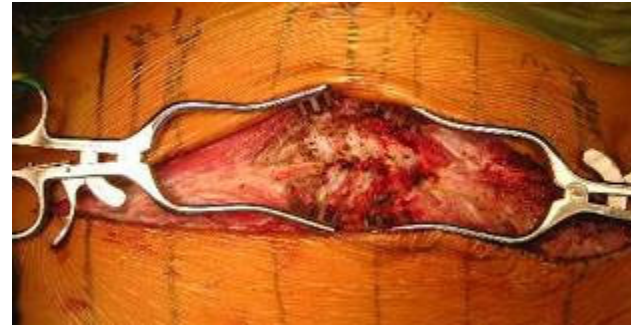
# Surgical Strategy

- 1) Flexibility films determine if anterior apical release necessary – staged
- 2) Goal: Correct apex to normal alignment in all planes
- 3) Preoperative planning for screw placement - blueprint
- 4) Leave rods long for growth



# Surgical Techniques

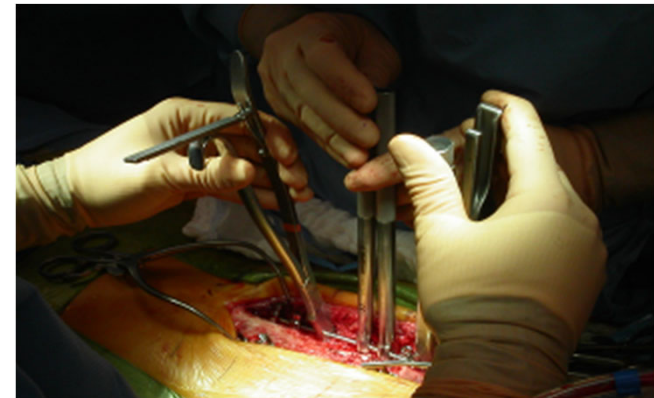
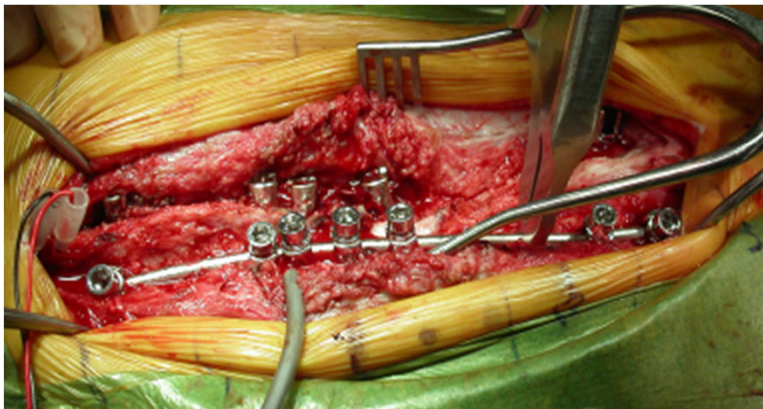
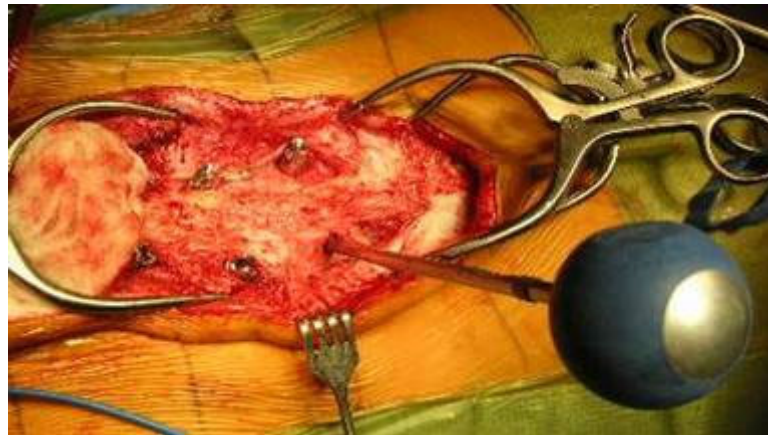
- Subperiosteal exposure of apex only
- Subfascial exposure for growing screws
- Thoracoplasty – graft harvest and deformity correction





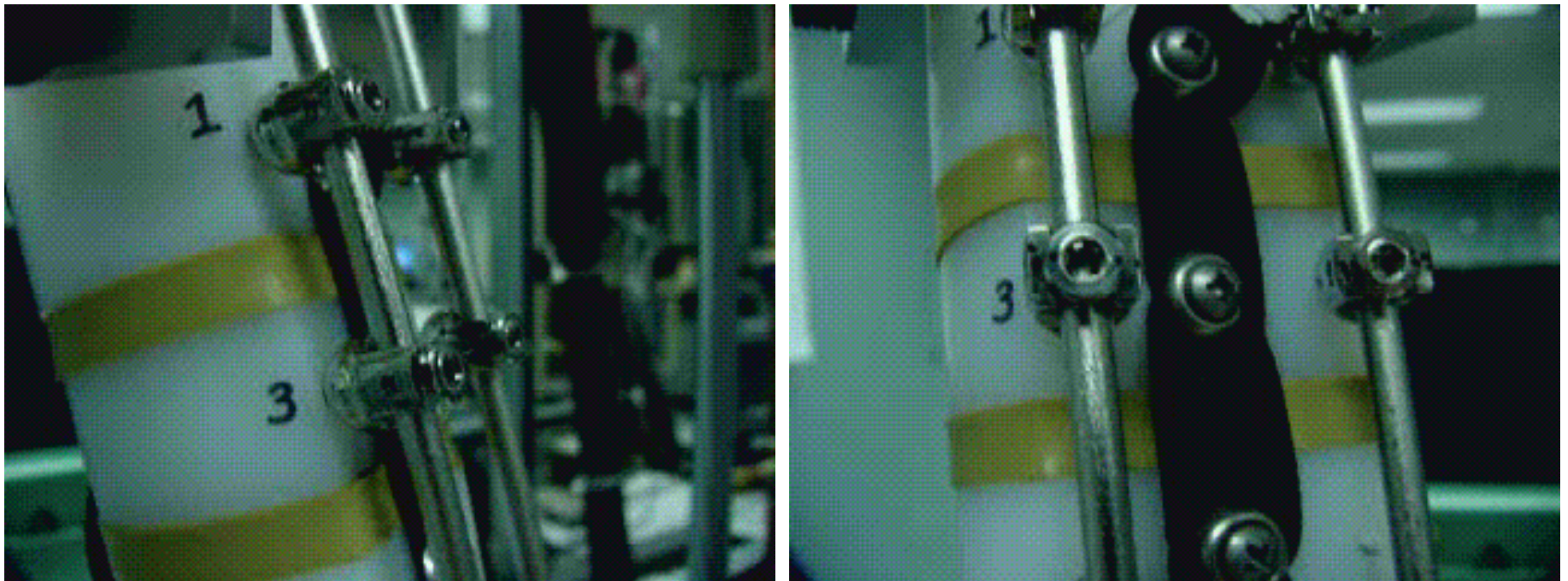
# Surgical Techniques

- Growing screws placed with C-arm radiographs
- Rod and apical screw derotation



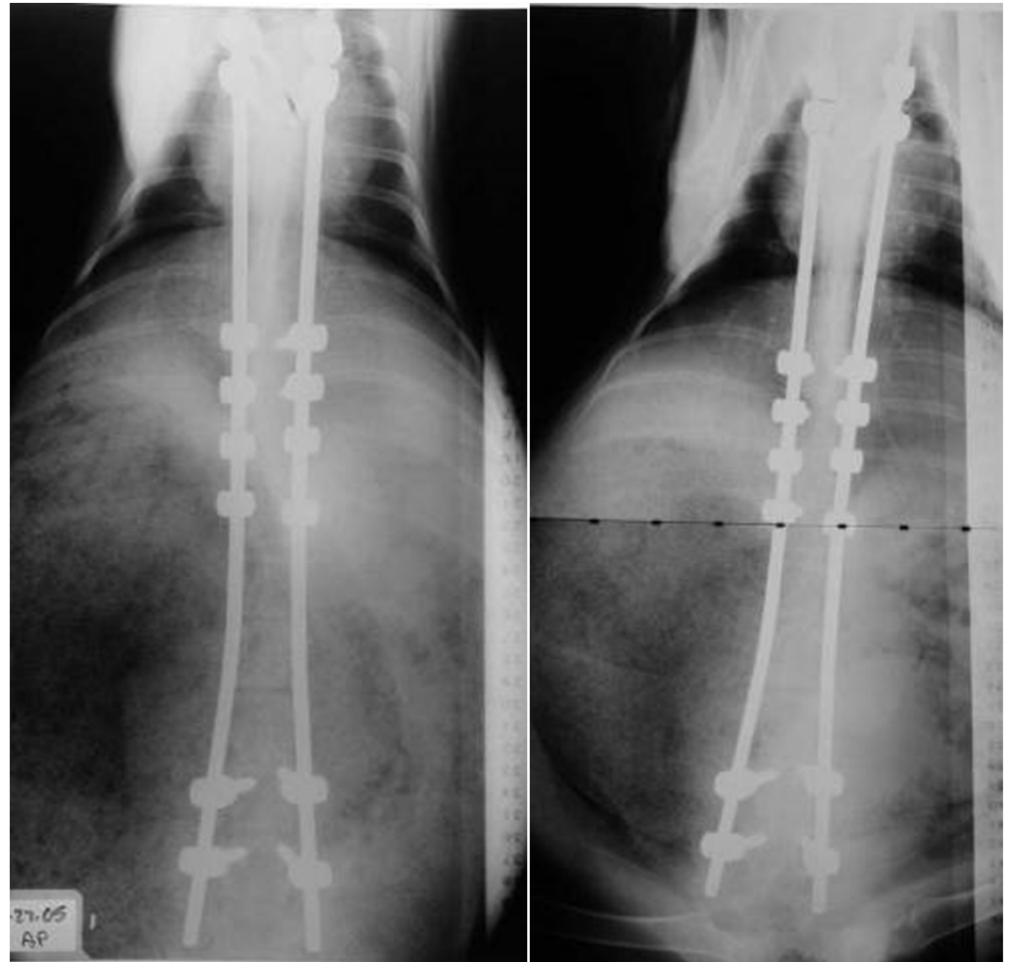
# Background Research

- Laboratory cycling – 1 million cycles
  - No implant failures
  - Metal filings



# Background Research

- Animal Research – goats
  - All grew
  - No apical stenosis
  - Joints maintained

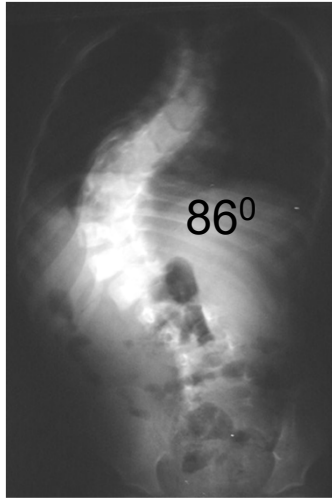


10 weeks

22 weeks

# Index Patient

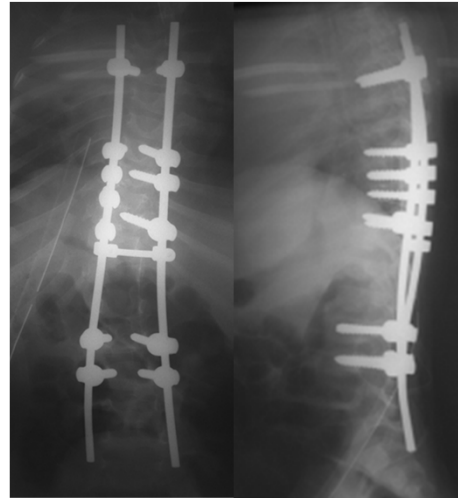
- Infantile Idiopathic Scoliosis
- 2+10 years



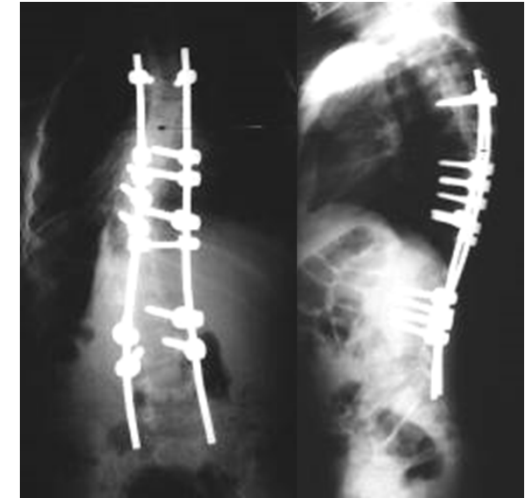
Preop



Preop Flexibility



6 wks postop

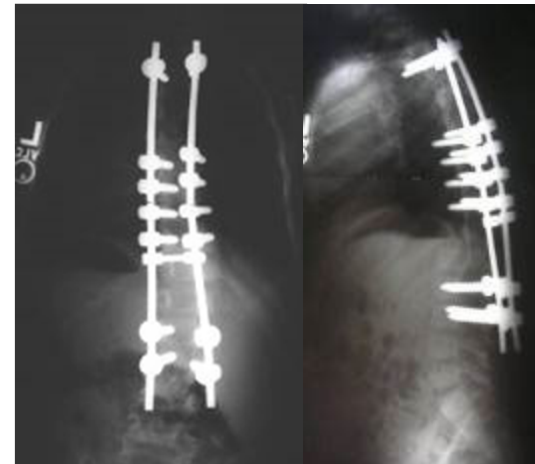
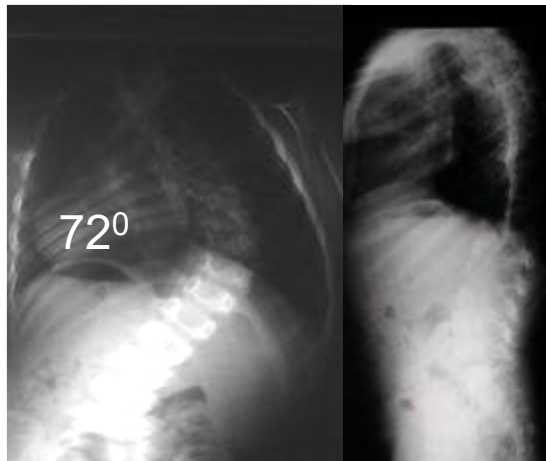


2 yrs postop



# Results - early

- Twenty patients
  - 15 pts-Little Rock – Richard E. McCarthy
  - 5 pts- St. Louis - Lawrence Lenke, Scott Luhmann
- Age 6+1 yrs (range 2+10 to 11 yrs)
- Multiple diagnoses (neuromuscular, congenital, idiopathic)
- Scoliosis  $71.5^{\circ}$   $\longrightarrow$   $24^{\circ}$   
Corrected to
- Two yr follow-up: 3 pts.
- None have reached maturity



# Problems

- Two infections – I and D
- Revisions
  - Implant prominence (5)  
(2 temporary rod removal)
  - Rod breakage (1)
  - Screw pullout (1)
  - Growth off ends of rods (1)
  - Inability to control:
    - Pelvic obliquity – SMA pt. (1)
    - Double major curve – idiopathic pt. (1)

# Conclusion

We are reporting early results on a challenging group of patients who have undergone a new surgical approach that allows them to be brace free, able to grow, without repeated spinal lengthenings.