Convex Growth Arrest

Muharrem Yazici

Hacettepe
Orthopaedics
Spine Unit

Growth modulation

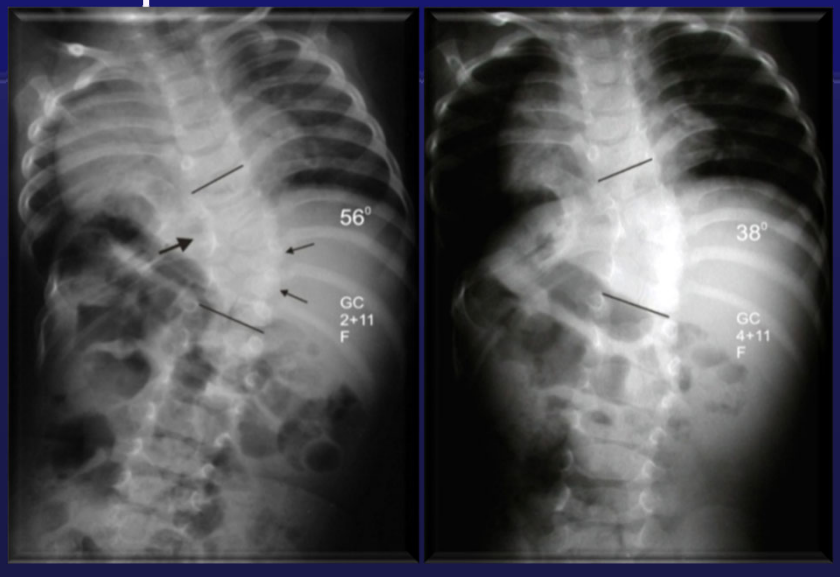
- Physis
  - Longitudinal growth
  - Imbalances in the growth
    - Shortening
    - Angular deformity
- Interfering physeal growth
  - Epiphysiodesis
    - Total or partial
    - Temporary or permanent

Congenital spinal deformities

- Anomalous vertebrae
- Longitudinal growth imbalance
  - Progressive deformity
  - Trunk imbalance

Congenital spine deformity

- Asymmetrical growth potential
- Control of growth of the convexity
  - Relatively longer
- Halt progression and lead to spontaneous correction with subsequent growth
- Safe, effective and simple



CGA/Background

- Stapling
  - Smith A, JBJS *Am* 1954
- CGA
  - Roaf R, JBJS *Br* 1963

Indications

- Progressive curve
- Patients younger than 5 years old
- Pure scoliotic deformity
  - Without major kyphosis or lordosis
  - ≤ 70°
  - 5 segments or less
  - No unsegmented bar
  - Intact posterior elements

Technique

- Anterior-posterior surgery
  - Sequential or staged
- Anterior
  - Convex half of the discs and endplates
- Posterior
  - Tip of SP to TP, including facet joints
- Limits for fusion
  - Formation defect
    - Cobb to Cobb
  - Segmentation defect
    - + One above and one below
- Casting for 4-6 months

Modifications

- King, *Spine* 1992 and Keller, *Spine* 1994
  - Transpedicular approach for anterior hemiepiphysiodesis
    - (+) One-stage surgery
    - (-) Incomplete epiphysiodesis
- Cheung, *Spine* 2002
  - With concave distraction
    - Immediate improvement in the coronal balance
    - No need to wait uncertain growth –mediated correction
- Ginsburg, *JPO* 2007
  - Short posterior instrumention
    - No immobilization postoperatively

Results

- Epipyhsiodesis effect 20-77%
- Fusion effect 17-70%
- Progression 0-12%

Hacettepe experience

SPINE Volume 28, Number 8, pp 799–805

The Efficacy of Convex Hemiepiphysiodesis in Patients With Iatrogenic Posterior Element Deficiency Resulting from Diastematomyelia Excision

Akin Uzumcugil, MD,* Akin Cil, MD,* Muharrem Yazici, MD,* Emre Acaroglu, MD,* Ahmet Alanay, MD,* Nejat Akalan, MD,† Pınar Ozisik, MD,† and Adil Surat, MD*

SPINE Volume 29, Number 5, pp 547–553

The Course of Sagittal Plane Abnormality in the Patients With Congenital Scoliosis Managed With Convex Growth Arrest

Akin Cil, MD, Muharrem Yazici, MD, Ahmet Alanay, MD, R. Emre Acaroglu, MD, Akin Uzumcugil, MD, and Adil Surat, MD

ORIGINAL ARTICLE

Convex Growth Arrest in the Treatment of Congenital Spinal Deformities, Revisited

Akin Uzumcugil, MD, Akin Cil, MD, Muharrem Yazici, MD, Emre Acaroglu, MD, Ahmet Alanay, MD, Cemalettin Aksoy, MD, and Adil Surat, MD

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Conclusions. Convex epiphysiodesis is an effective method for patients with midline laminectomy defect as those with intact posterior elements. Because the facet joints and transverse processes usually are unaffected, the presence of midline defect does not diminish the efficacy of the technique. [Key words: congenital, convex hemiepiphysiodesis, diastematomyelia, intraspinal pathology, scoliosis, surgery, treatment] **Spine 2003;28: 799–805**

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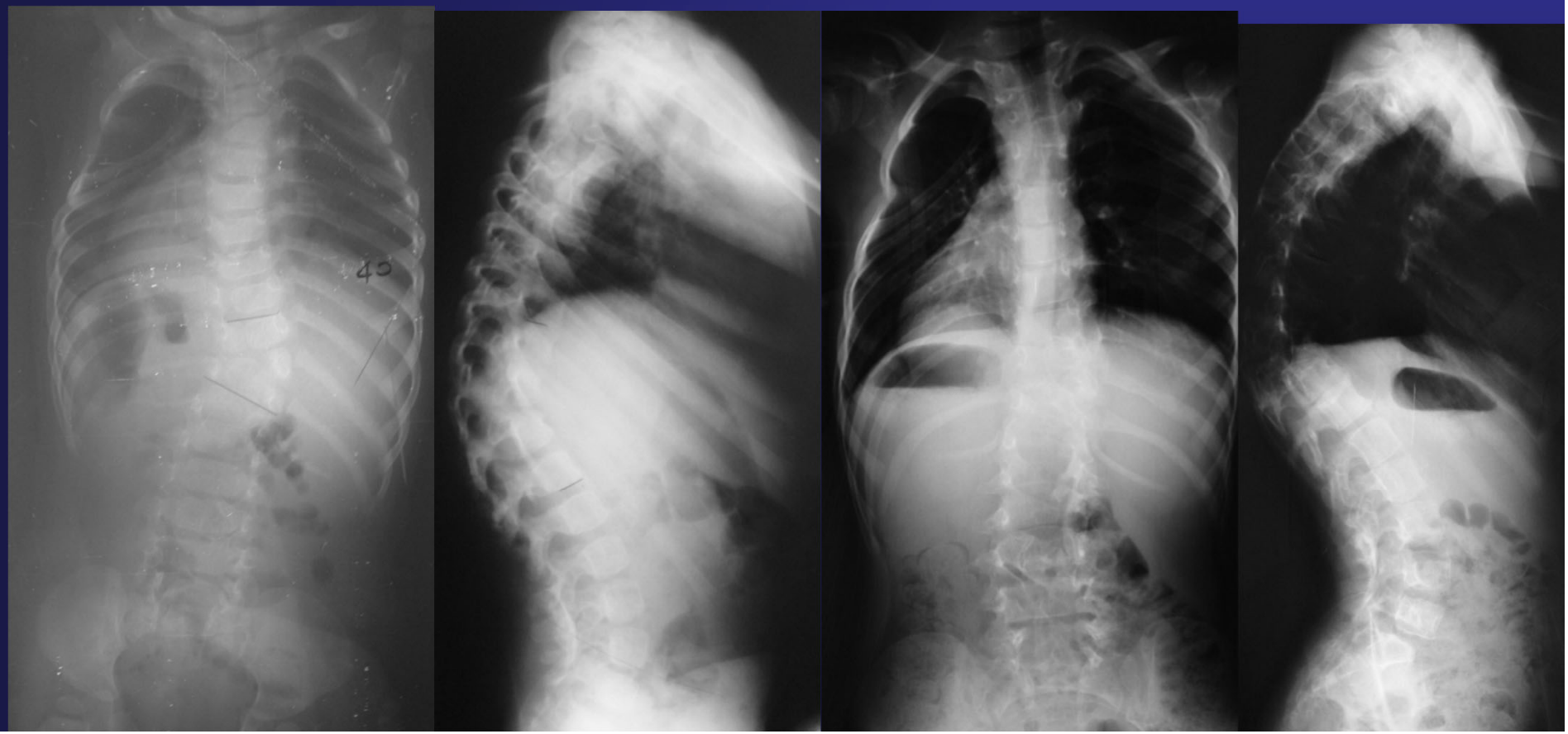
Conclusion. Sagittal segmental abnormality does not have a negative effect on the control of scoliosis in the majority of the patients (11 of 13). If the coronal curvesta-bilizes or improves, then sagittal segmental abnormality could also be stabilized (in 7 of 11 patients). [Key words: scoliosis, congenital, treatment, surgery, convex growth arrest, kyphosis, lordosis] **Spine 2004;29:547–553**

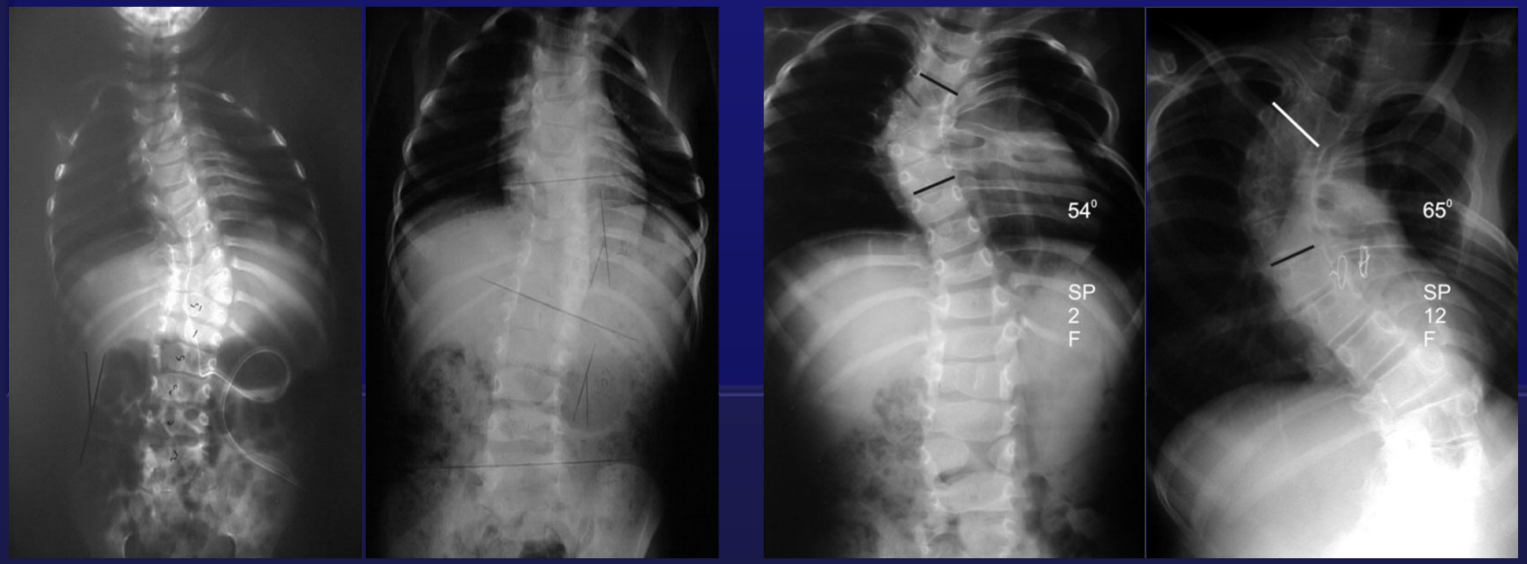
Abstract: The authors studied 32 patients to delineate the reliability of well-defined but frequently extended indications to define the ideal patient who will benefit from convex growth arrest. Mean age at the time of convex growth arrest was 29 (range 6–72) months, and average follow-up was 40 (24–120) months. Mean Cobb angle was 55 degrees (31–105 degrees) before surgery and 50 degrees (13–107 degrees) at final follow-up. Thirteen patients (41%) had a true epiphysiodesis effect, while 15 (47%) had fusion and 4 (12%) had progression. The age at surgery, magnitude, length and location of the curve, presence of intraspinal anomaly, and presence of sagittal plane or rib deformity were investigated in terms of the outcome, but none of these parameters was found to have an effect on the outcome. In conclusion, convex growth arrest is a safe and effective method in the management of the young patients with congenital spinal deformities. It can be performed for the balanced and cosmetically acceptable deformities of patients younger than 5 years of age regardless of the type, length, magnitude, and location of the curve, the existence of associated rib fusion, or the presence of sagittal plane abnormality.

Sagittal plane abnormality

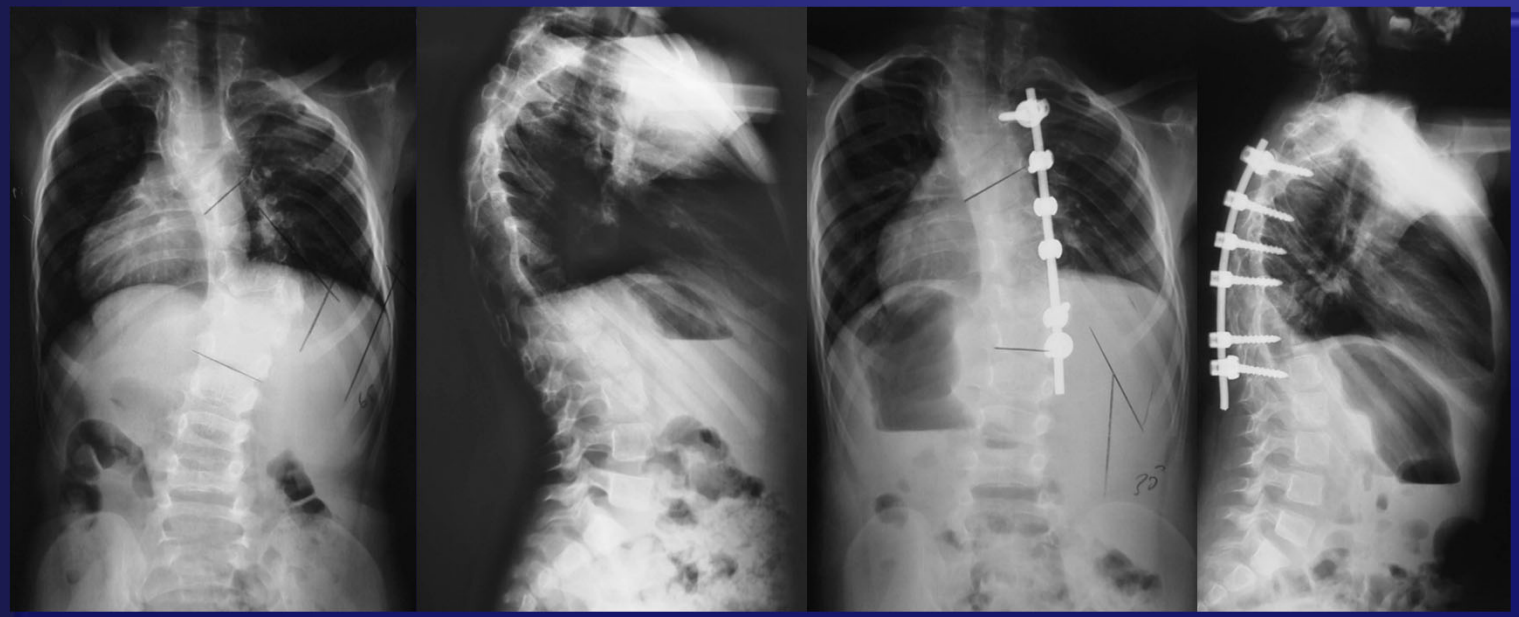


Convex growth arrest

- Behavior of the curve after CGA is UNPREDICTABLE
- Why some patients responded well to tx and others not?



Hacettepe modification v1



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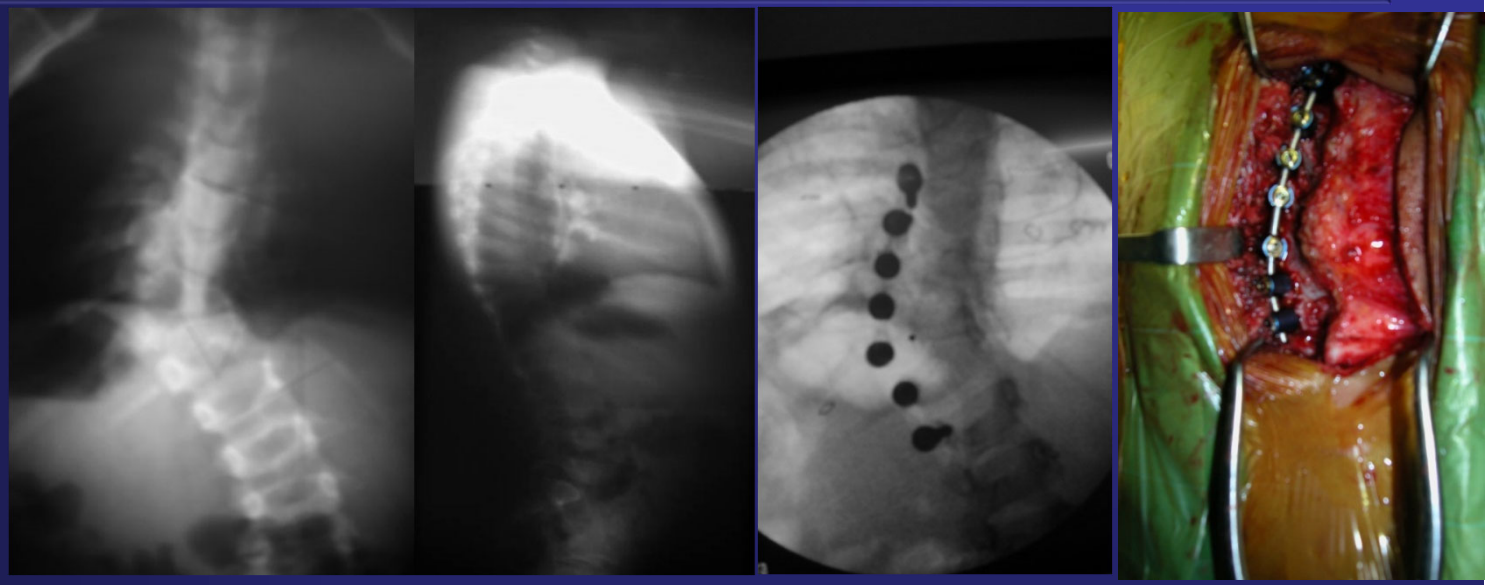
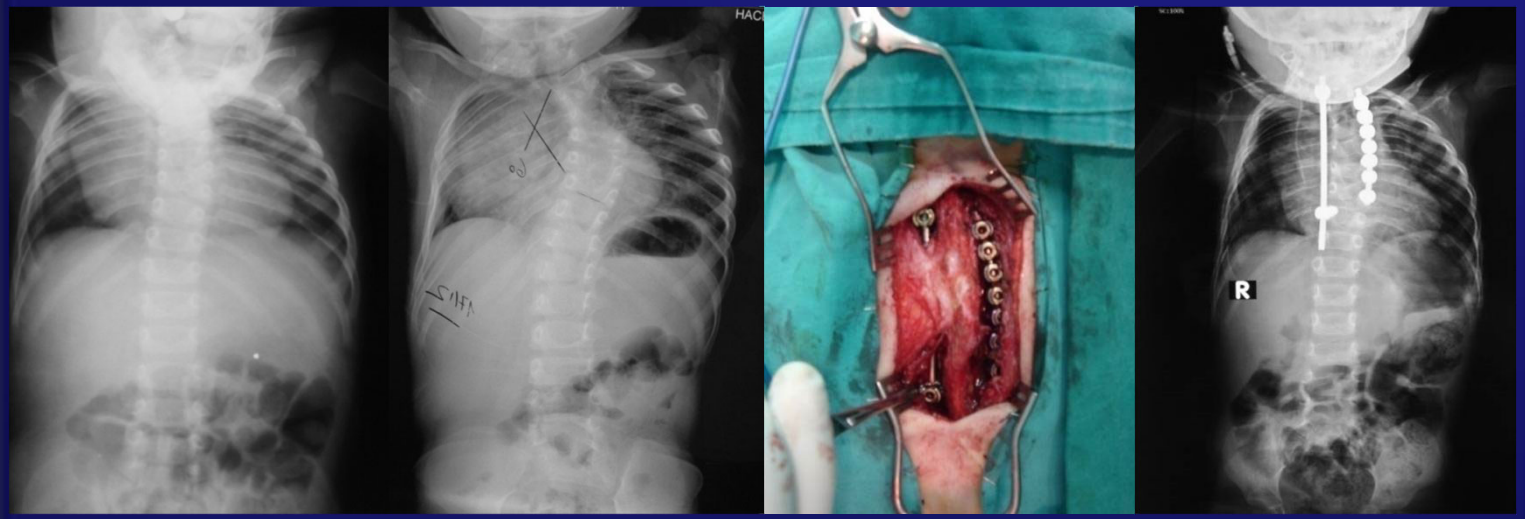
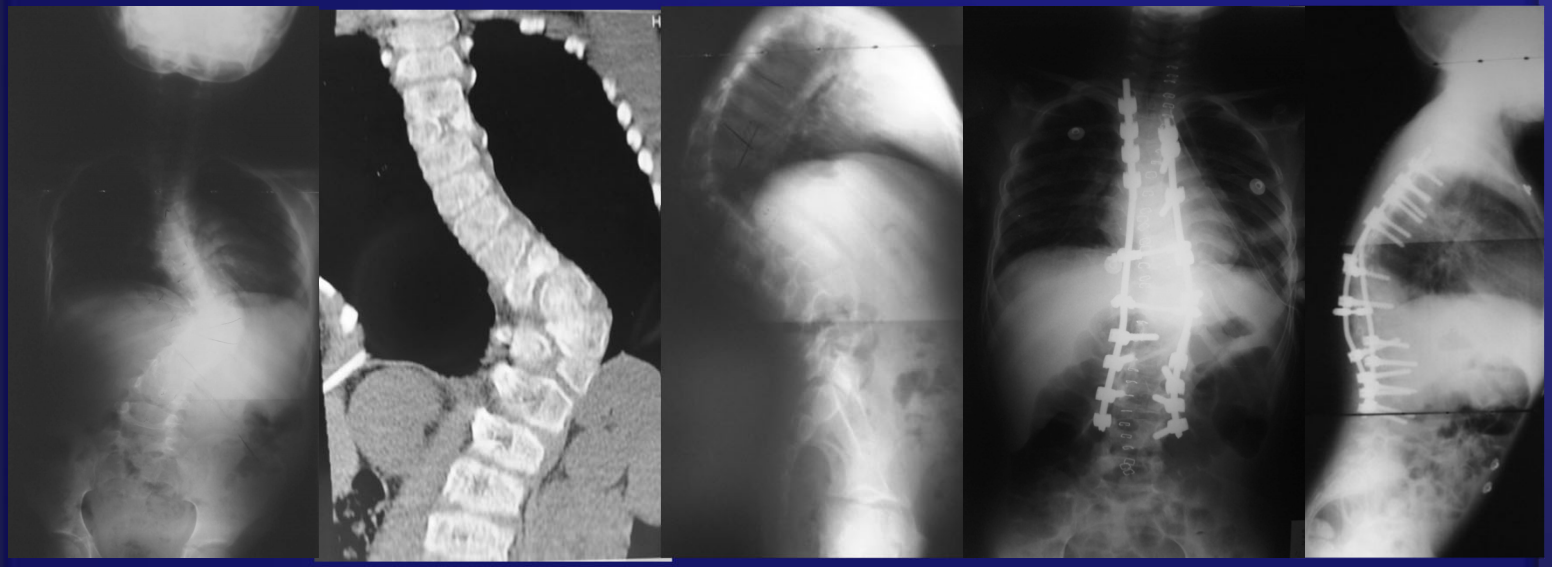


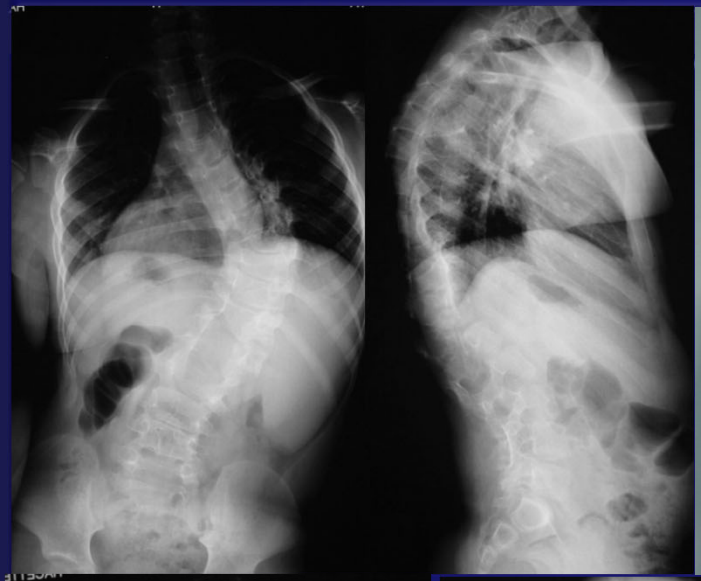
Hacettepe modification v2



Vertebral column resection after CGA



Posterior osteotomy&instrumentation after CGA





Convex growth arrest

- It can be performed for the balanced and cosmetically acceptable deformities of the young pts regardless
  - Type, length, magnitude and localization of the curve
  - Existence of associated rib fusion
  - Presence of sagittal plane abnormality

Convex growth arrest

- More severe and imbalanced curves
  - Hemivertebrectomy or apical vertebral resection can be the treatment of choice
- When major reconstructive surgeries are considered too risky
  - Age of the child
    - CGA can be considered a way to stabilize the deformity until the child grows
      - Further reconstruction is not precluded