Multisegmental Instrumentation and Growth-friendly Implants: Enemy brothers?

10th International Congress on Early Onset Scoliosis

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GROWTH FRIENDLY SPINE SURGERY

Distraction-based systems;

- Subcutaneous rod
- Traditional growing rod
- VEPTR
- Magnetically controlled growing rod (MCGR)

Static system with prolonged immobilization by a rigid device

Requires repeated lengthenings

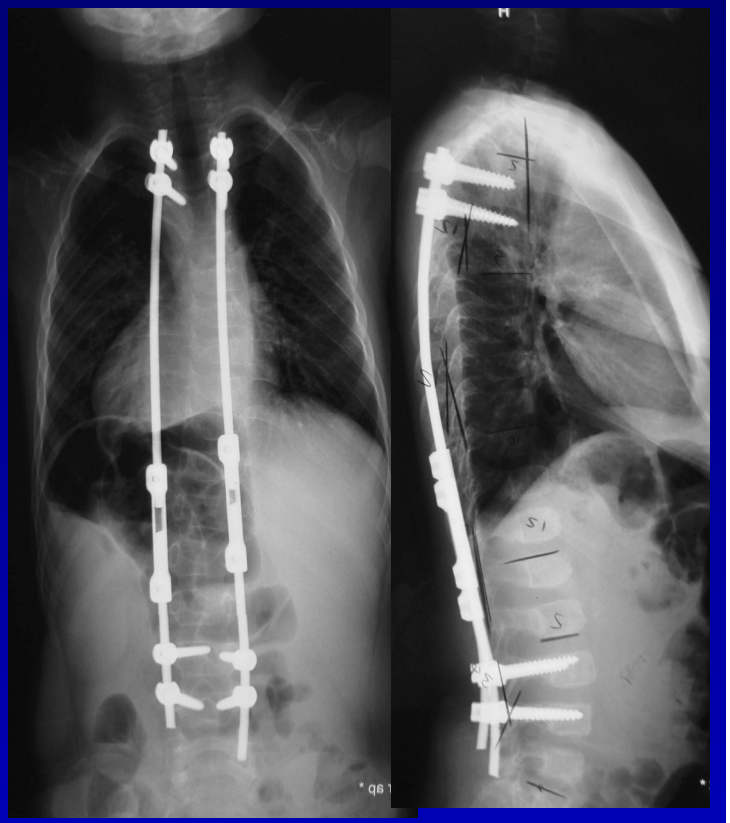
Guided growth systems;

- Luque-Trolley technique
- Shilla procedure
- Sliding growing rod with multisegmental instrumentation (ISC)

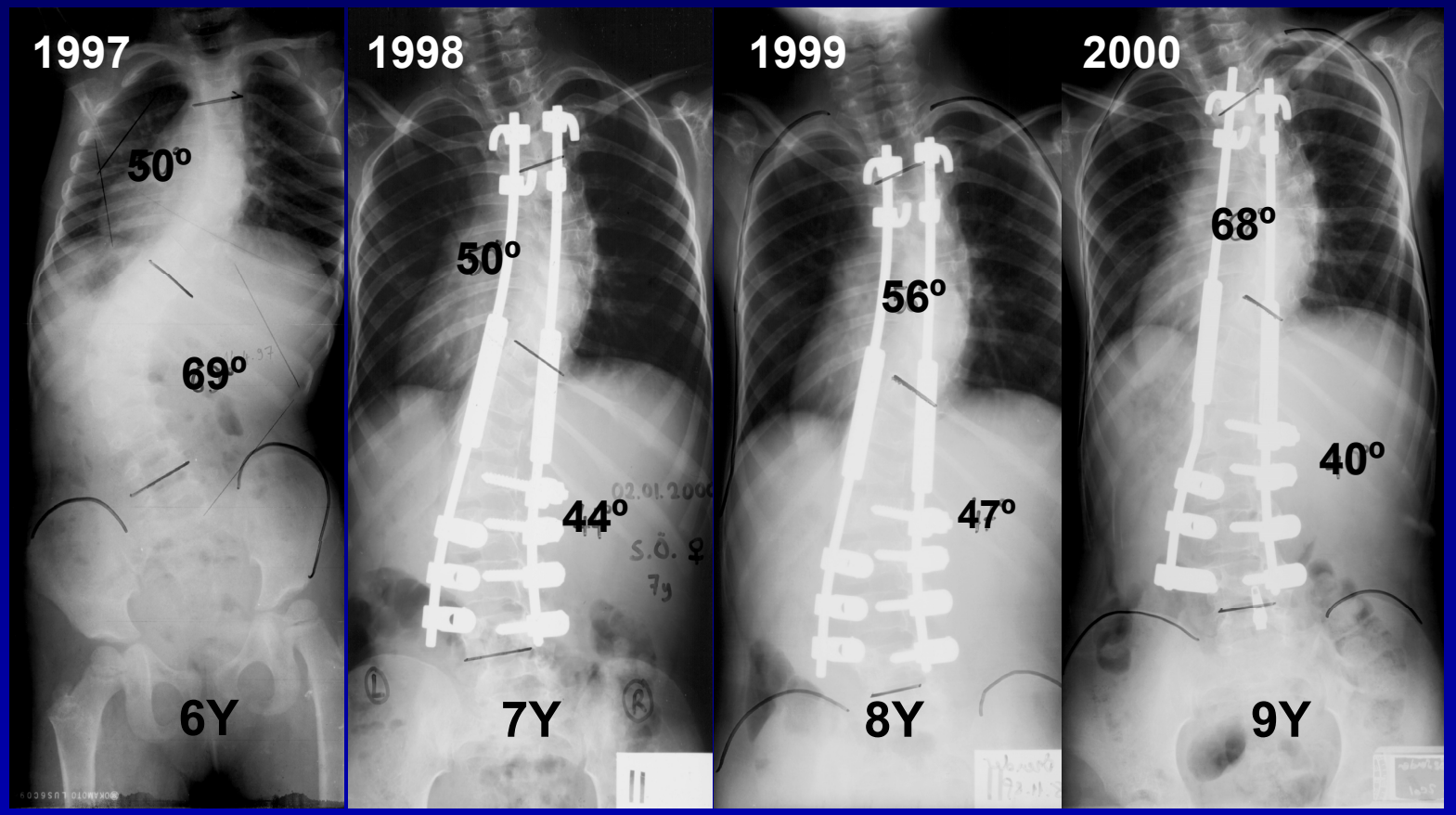
Dynamic system which allows self growing

Problems with distraction-based systems

- **Curve control is difficult in sagittal plane.**
- **Curve control is difficult in kyphoscoliosis.**
- **Requires repeated lengthening procedures.**
- **Traditional growing rods *do not provide a dynamic fixation*.**
- ***Have high complication rate (40-70%).***
- **Can result in spontaneous fusion after 6-7 lengthenings.**

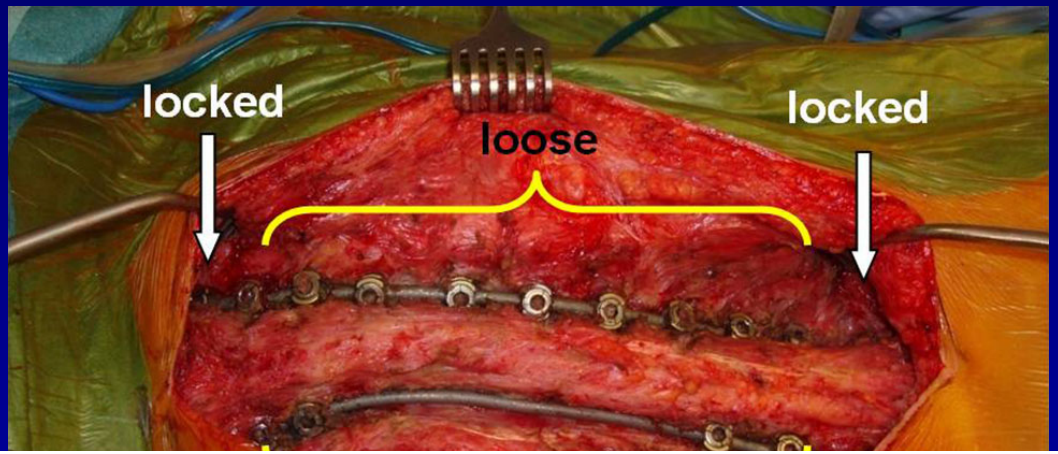


Problems with distraction-based systems



- There are no apical and intermediate anchors along the main curve, ***it can not control rotational deformity, anterior spinal growth continues and deformity progresses.***
- Correction of the deformity will be achieved through only pure distractive forces between proximal and distal anchors.

Growing Rod with Multisegment fixation



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SYMPOSIUM: AWARD PAPERS FROM TURKISH SOCIETY OF ORTHOPAEDICS AND TRAUMATOLOGY 2013

Apical and Intermediate Anchors Without Fusion Improve Cobb Angle and Thoracic Kyphosis in Early-onset Scoliosis

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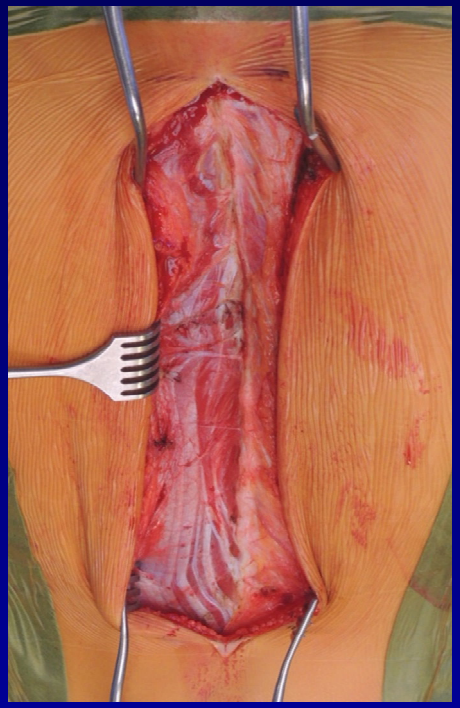
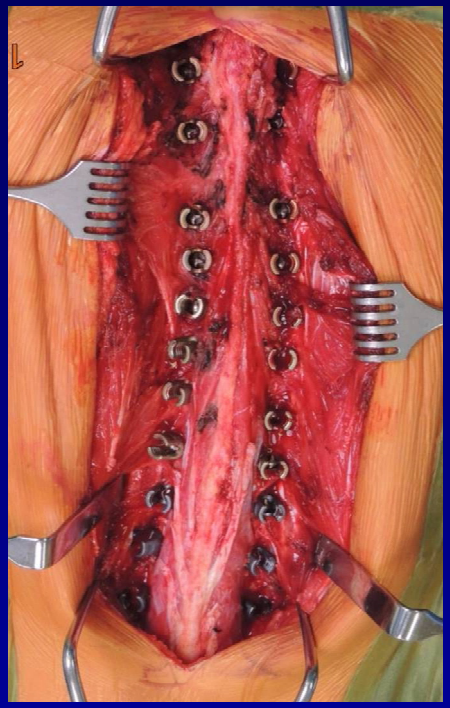
Surgical Technique

- We develop a ***dynamic fixation system instead of static fixation*** system which can be performed with any regular instrumentation system.
- Use of skull (J-Tongue) – femoral traction during the initial procedure provides more flexibility, decreases the need for forceful correction maneuvers on immature spine and prevents possible implant failures.

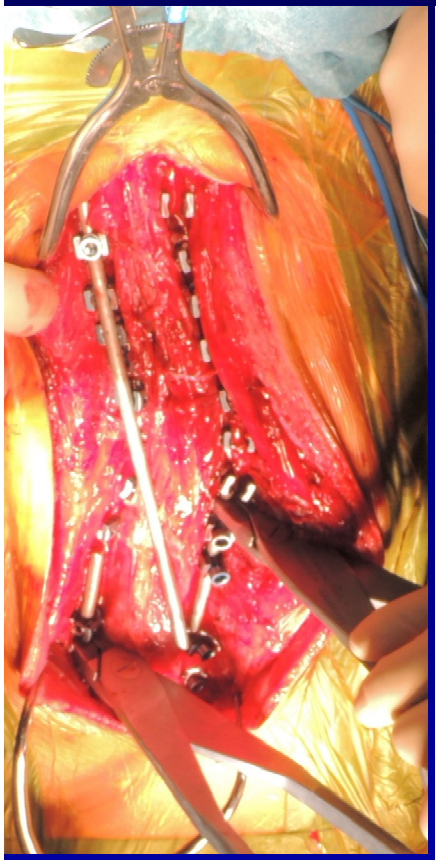
Surgical Technique

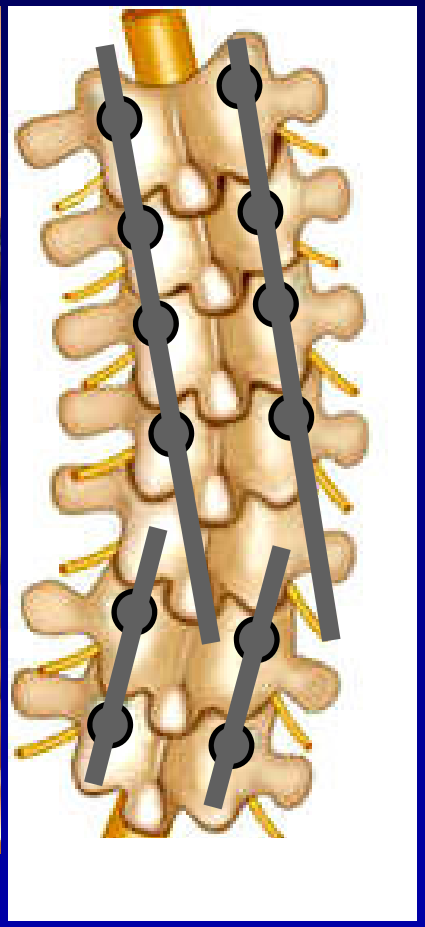


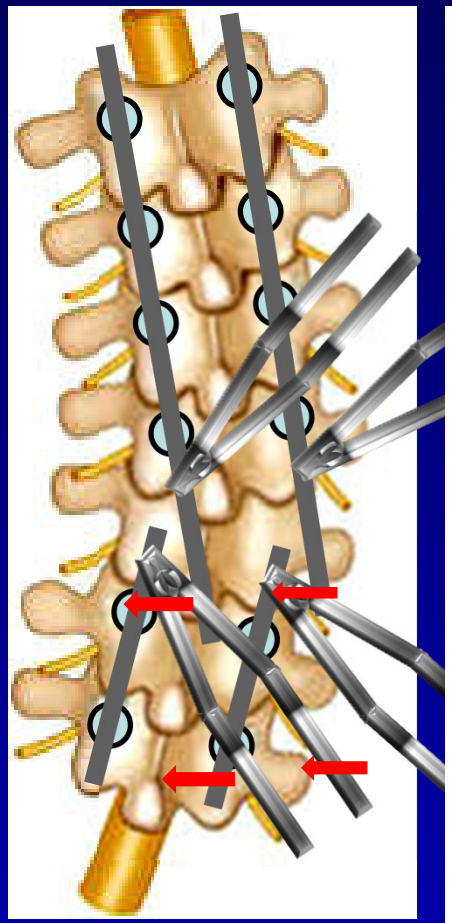


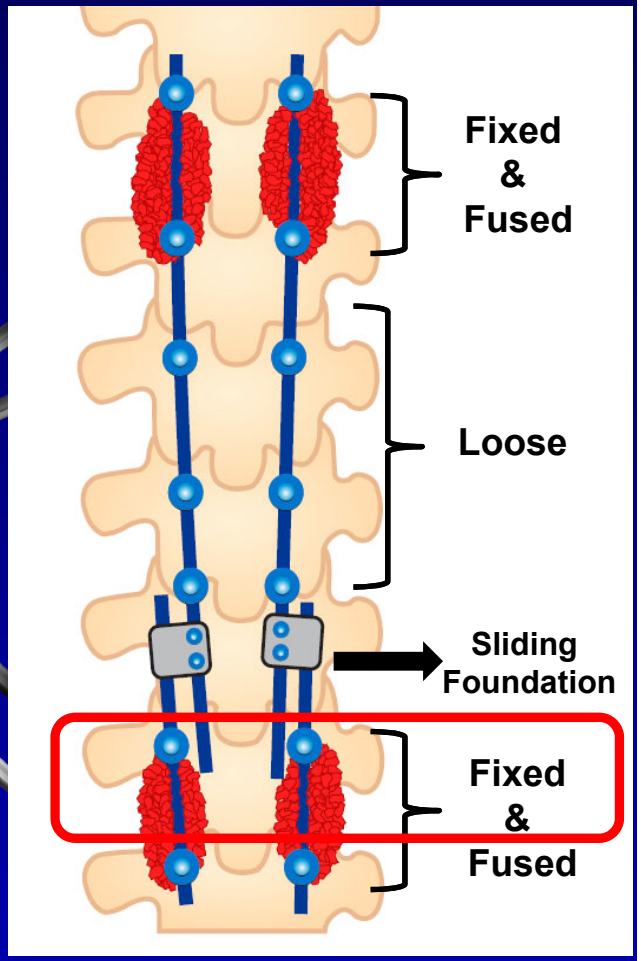
- **After skin-subcutaneous dissection, *placement of polyaxial pedicle screws into the strategic vertebrae under flouroscopic guidance with muscle sparing technique.***

- ***Under 5 years of age*** → ***cervical instrumentation system.***
- ***Between 5-9 years of age*** → ***pediatric instrumentation system.***



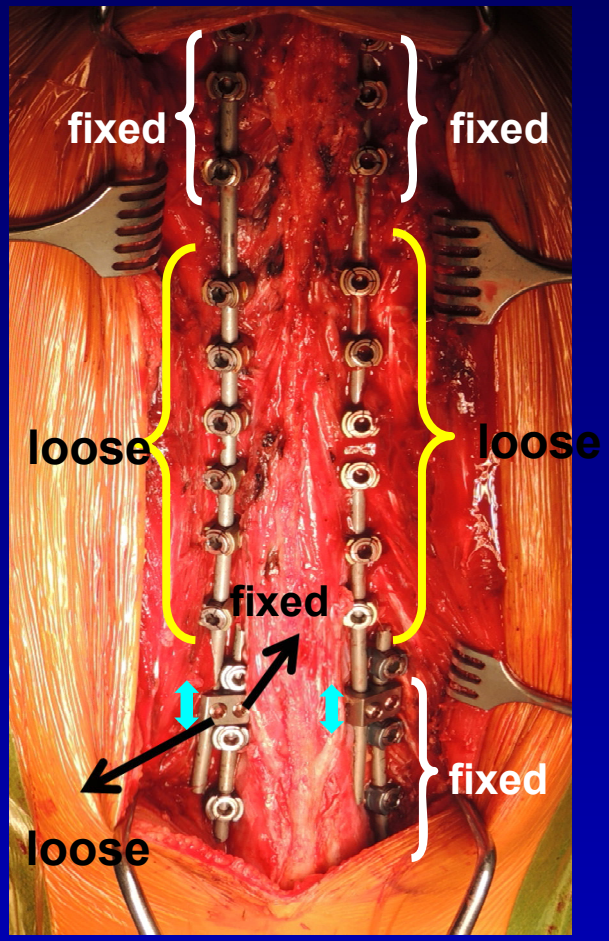


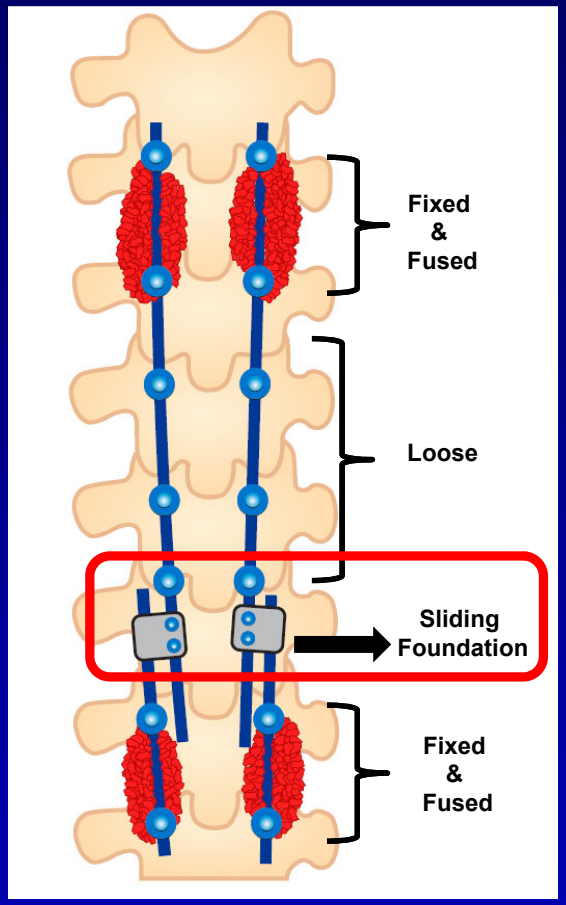


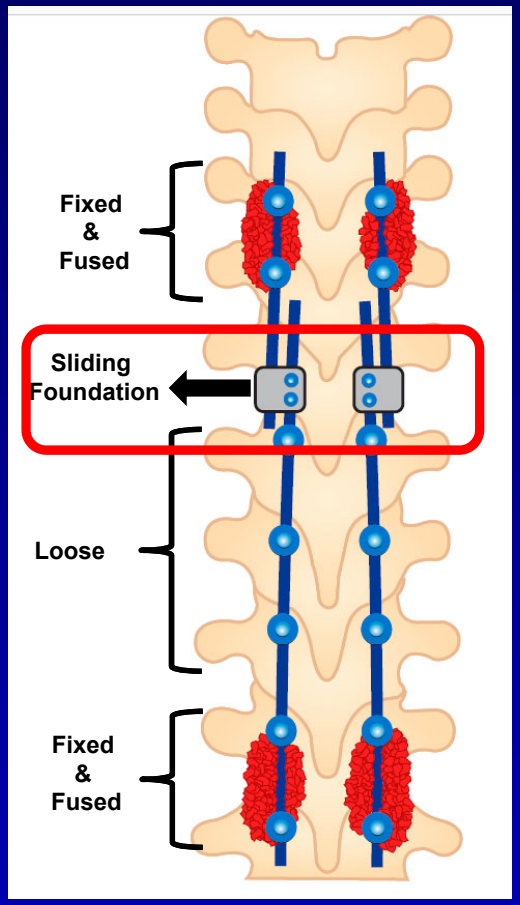


- Giving the proper contour to the rods and placement of proximal and distal rods.
- Deformity correction can be made with *cantilever correction manevuer with double rods and domino connectors.*

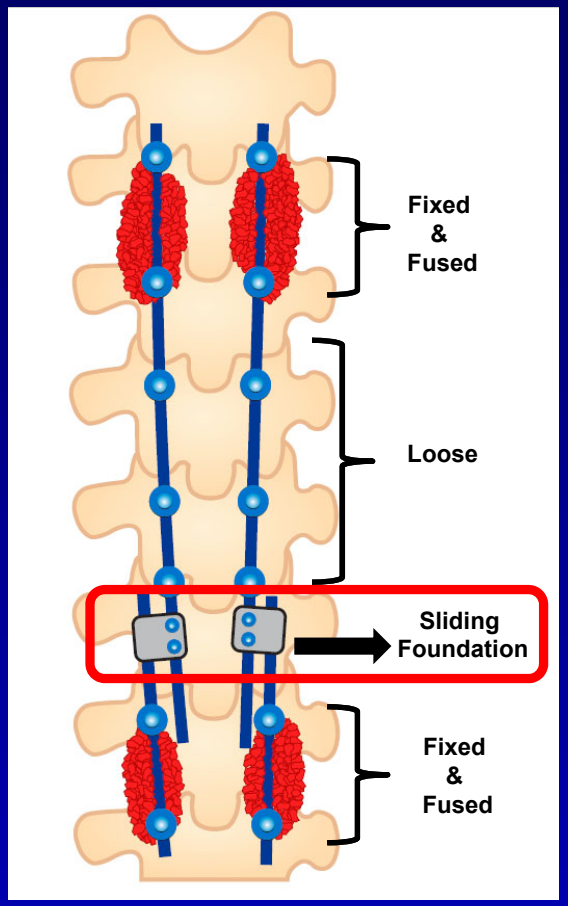
Surgical Technique

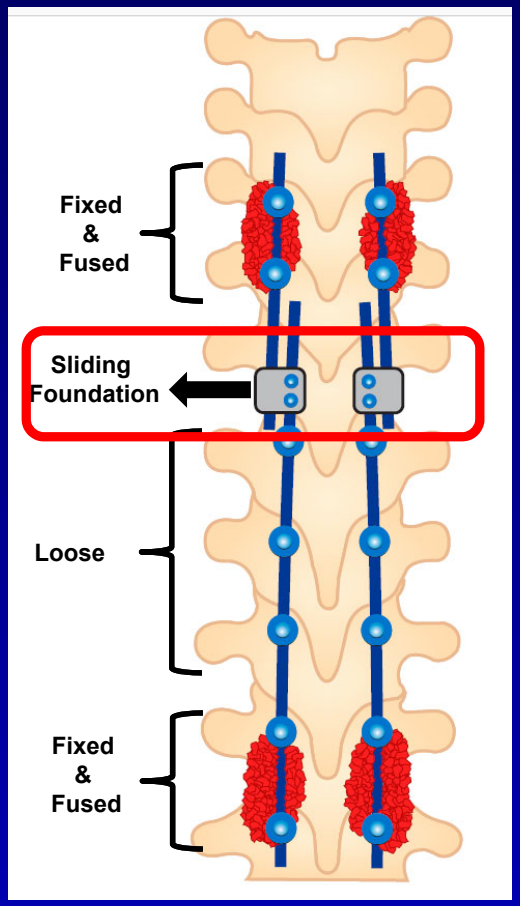




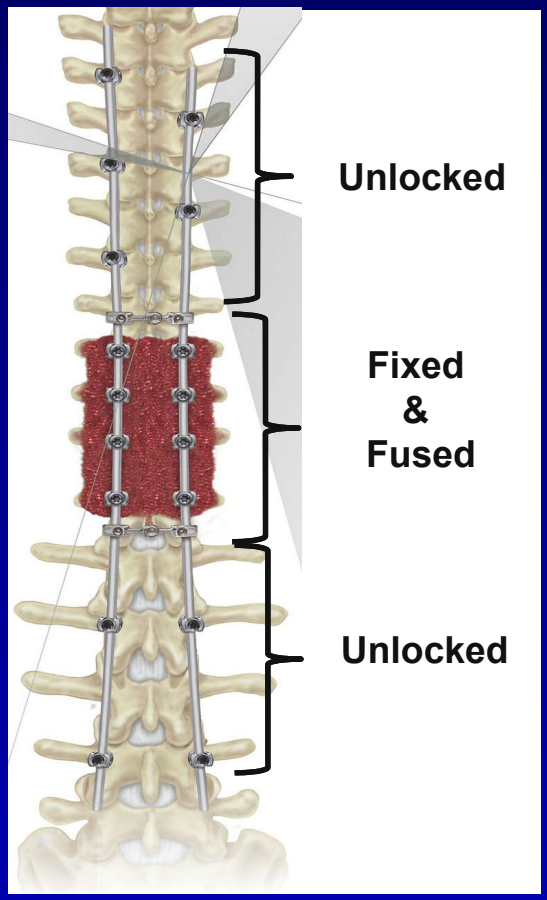


- Domino connectors were placed either at the lumbar or proximal thoracic region.
- Fixation and fusion of most proximal and most distal screws
- The rest of the screws have non-locked set-screws





Sliding growing rod with multisegmental instrumentation



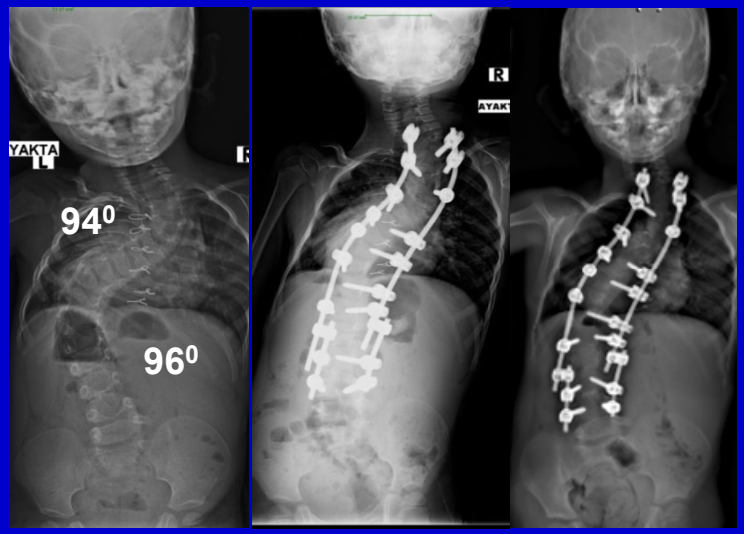
Shilla technique

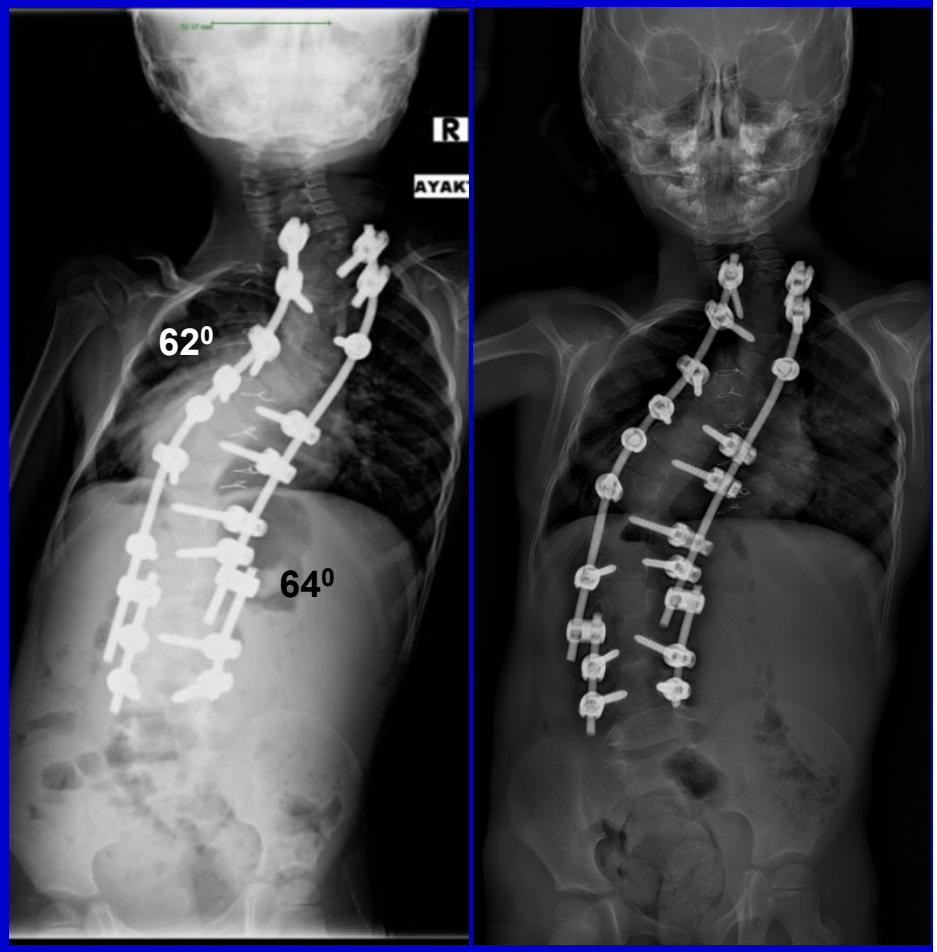
our clinical experience

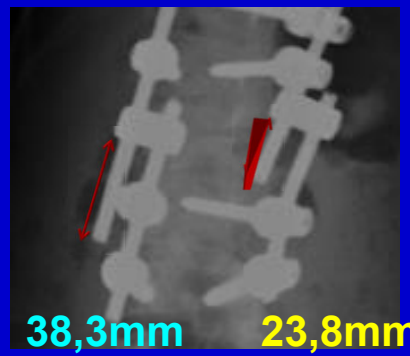
since 2011

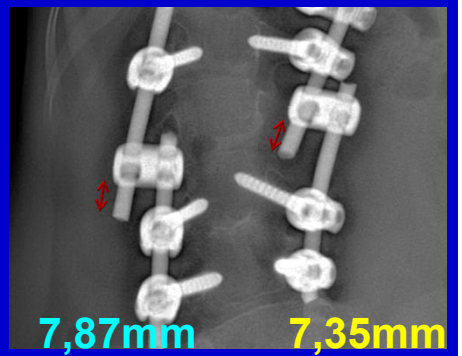
- **20 (13F/7M) patients were treated with Sliding Growing Rod with Multisegmental instrumentation.**
- **None of the patients had neurological impairments.**
- ***There was no rod breakages or other implant failure.***
- **The most common postop radiological finding is dislodgement of non-locked set screws mainly on the concave side.**

SO, M, 2y7m



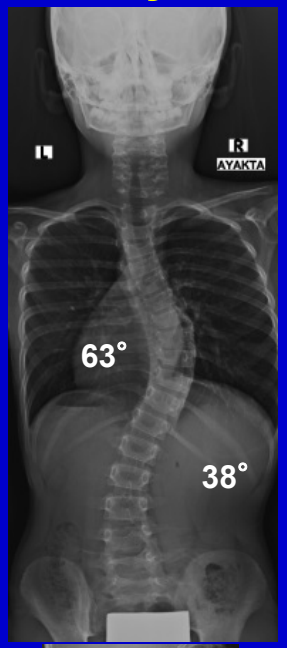


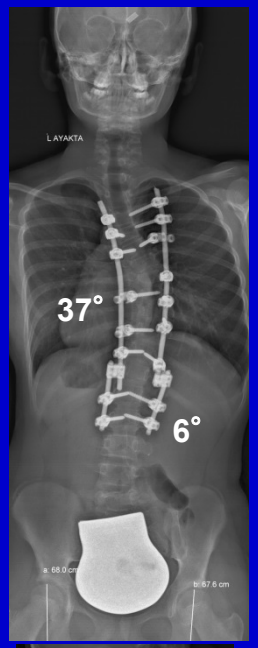


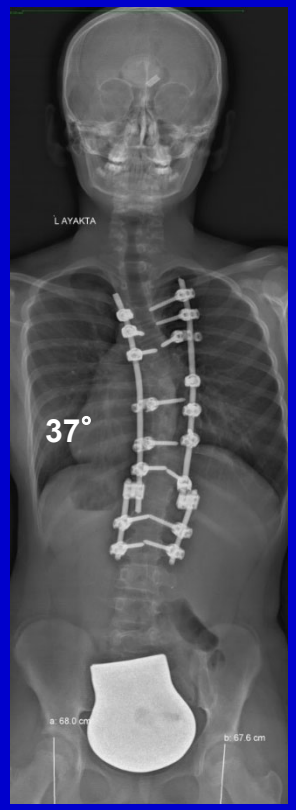


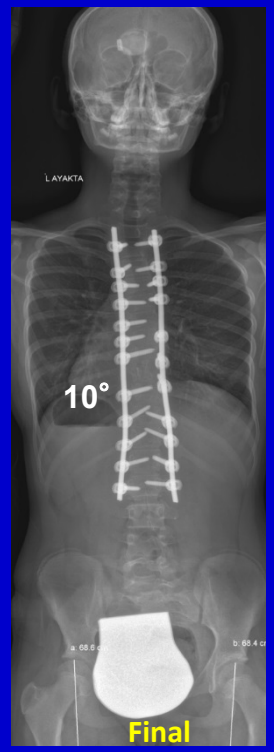
- *Increase in length was 0,69 mm per month.*
- *T1-S1 height was 0,78 mm per month*

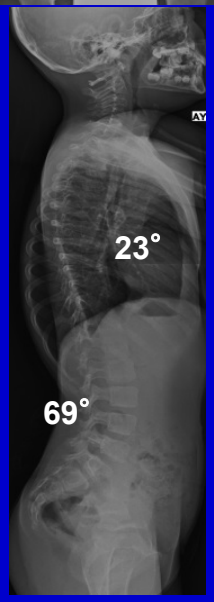
SK, F, 9y

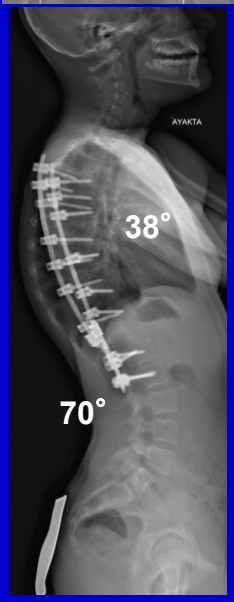


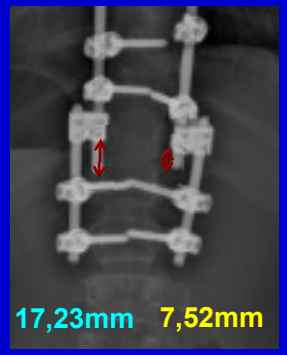


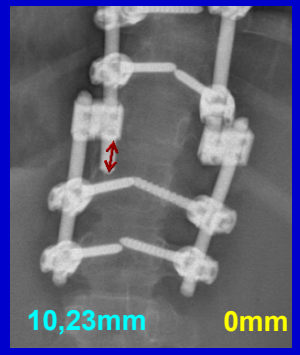






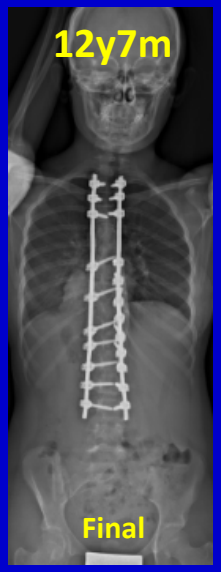


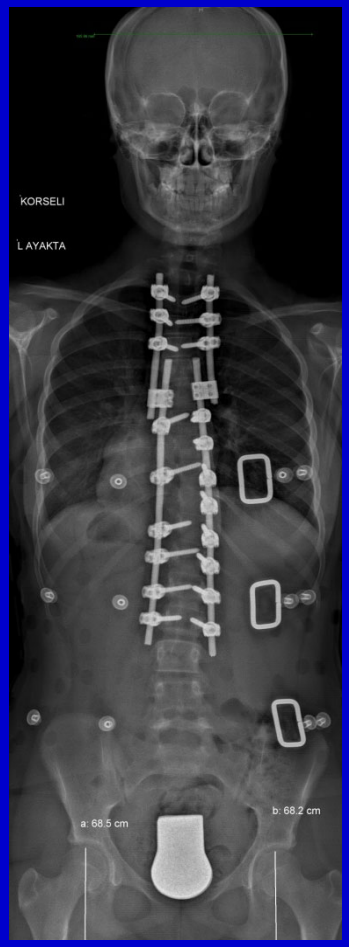


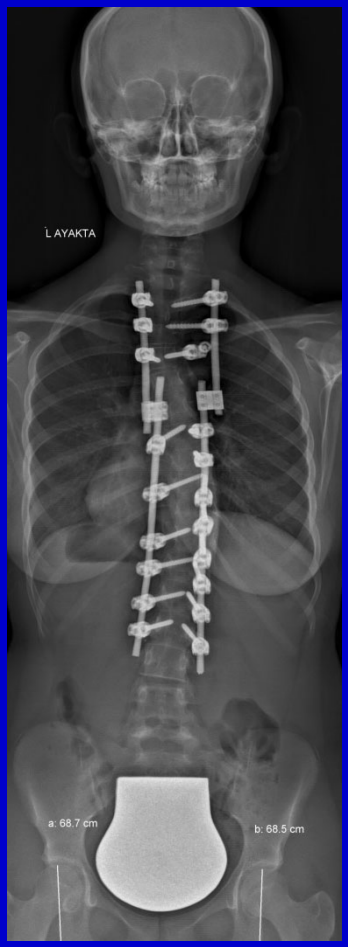


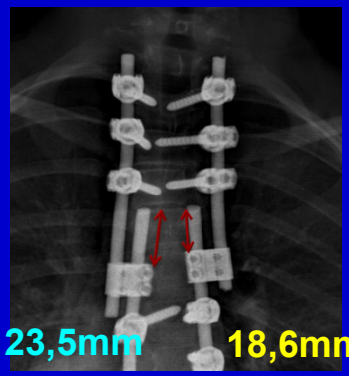
- *Increase in length was 1.04 mm per month.*
- *T1-S1 height was 1.28 mm per month*

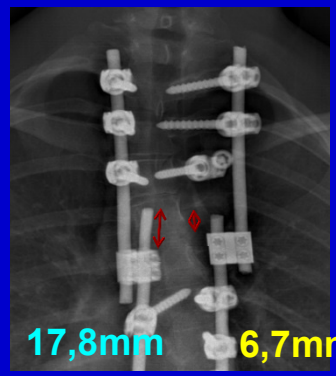
HKK, F, 9y4m





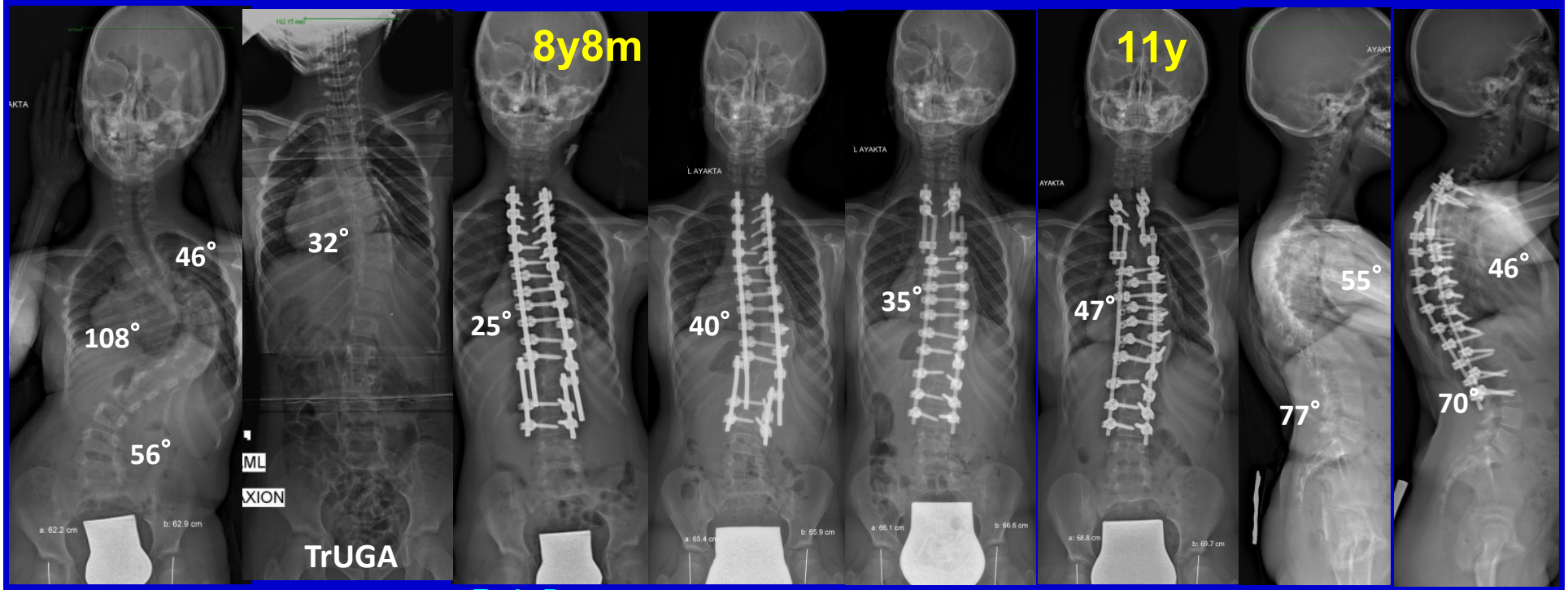




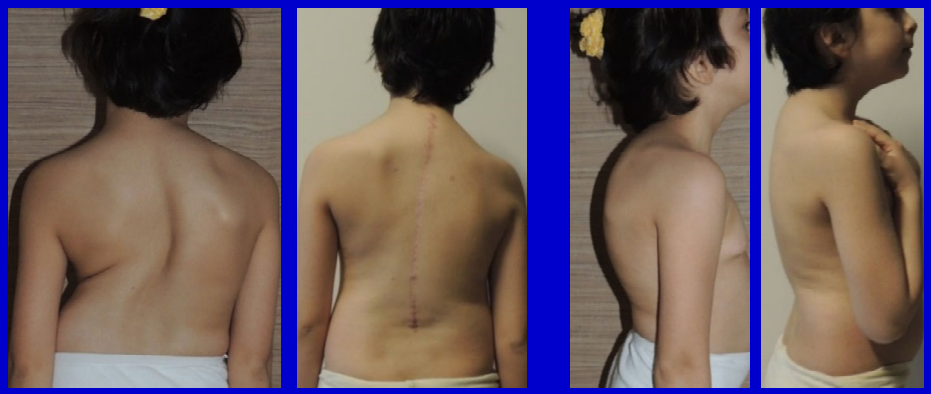


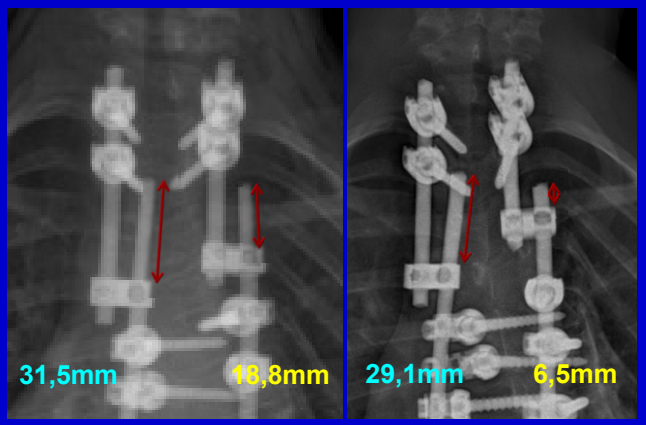
- *Increase in length* was *0,99 mm per month.*
- *T1-S1 height was 1.01 mm per month*

SA, F, 8y8m

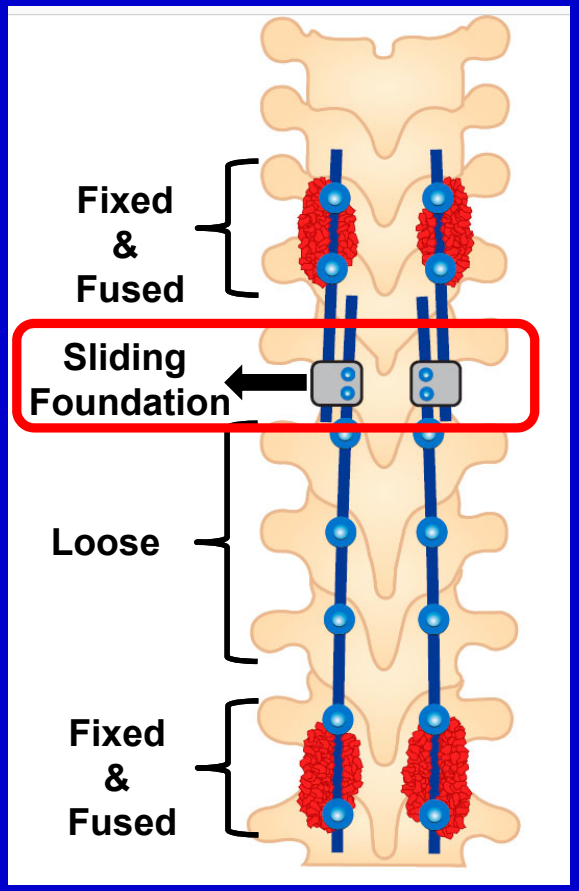


Early Postop





- *Increase in length was 0,78 mm per month.*
- *T1-S1 height was 0,85 mm per month*



- When sliding foundation is placed at proximal thoracic region, it provides better control of the lower curve and prevents trunk shift.

TAKE HOME MESSAGE

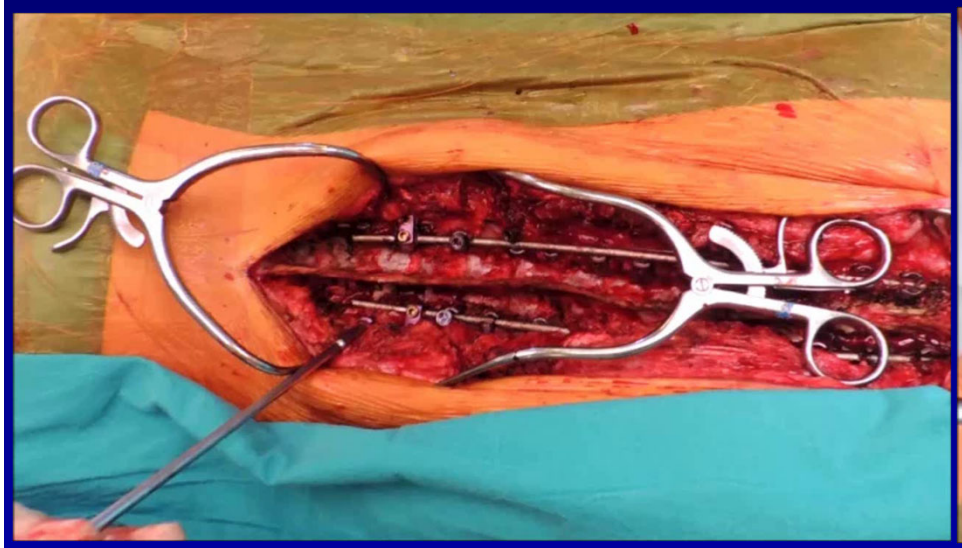
- The main advantages of ***Sliding growing rod technique with multisegmental instrumentation***;
  - do not require multiple lengthenings,
  - provide dynamic fixation which prevents auto-fusion
  - apical and intermediate anchors provide better control of the rotation and alignment in both coronal and sagittal planes
  - prevent progression of the deformity
  - Provides an 0,85 mm increase in T1-T12 length and 1,23 mm in T1-S1 height per month.

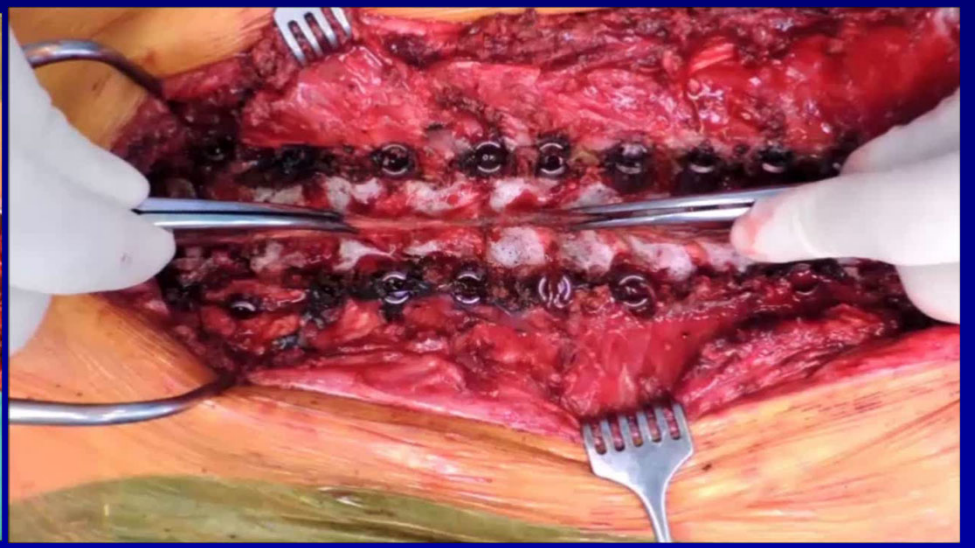
TAKE HOME MESSAGE

- The most common problem with Sliding growing rod technique is the dislogdement of unlocked set screws on the convex side. This can be prevented with special set screw design like Shilla screw.

- When sliding foundation placed proximally, it prevents trunk shift and rib cage will also support the correction.

TAKE HOME MESSAGE





- During the final fusion surgery of the sliding growing rod technique graduates, we did not observe any auto-fusion in none of the spinal segments.

THANK YOU
FOR YOUR ATTENTION

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