

# SLIDING-GROWING ROD TECHNIQUE IN THE TREATMENT OF EARLY ONSET SCOLIOSIS: CLINICAL AND RADIOLOGICAL OUTCOMES AND EFFECT ON PULMONARY FUNCTIONS

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**Paper #5 SLIDING-GROWING ROD TECHNIQUE IN THE  
TREATMENT OF EARLY ONSET SCOLIOSIS...**

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**Relationships Disclosed**

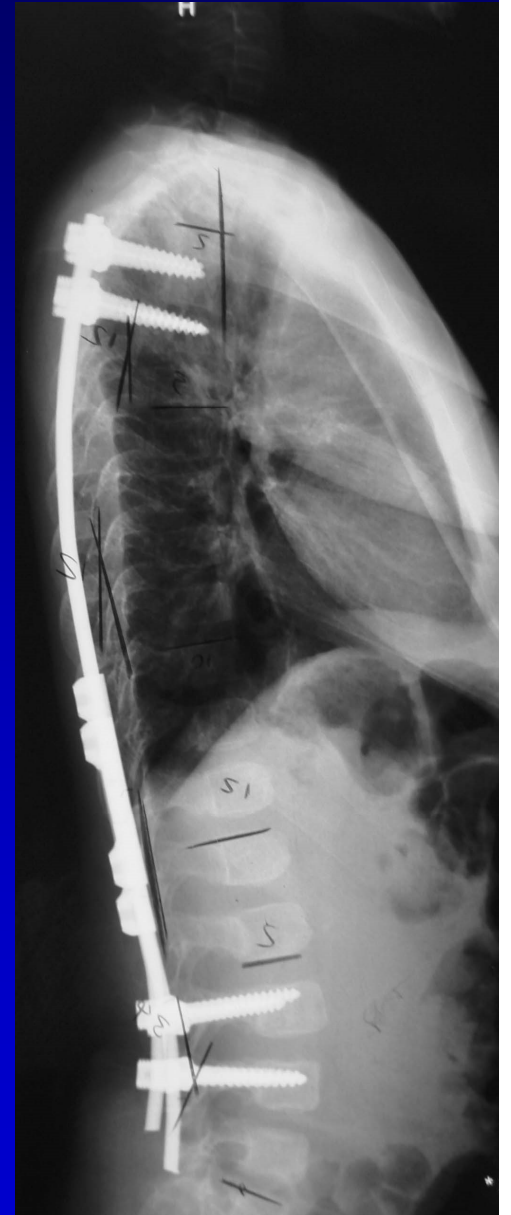
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ICEOS**

- (a) Grants/Research Support
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- (d) Speakers' Bureau
- (e) Other Financial Support

# BACKGROUND

- ✓ The main goal of treatment EOS is to obtain and maintain curve correction while simultaneously preserving trunk balance and growing the spine and the lungs
- ✓ Growing rods have become increasingly popular in the treatment EOS

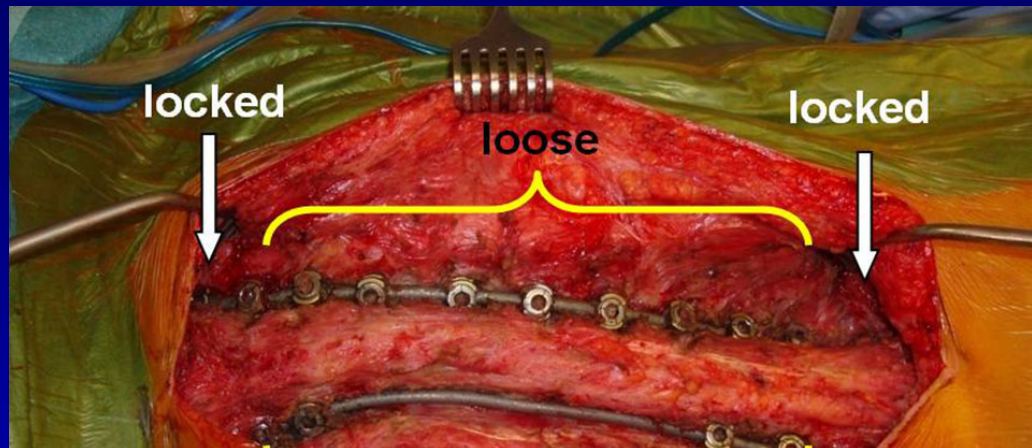


# **Disadvantages of traditional rods**

- **Correction of the deformity is achieved by only pure distractive forces between proximal and distal anchors**
- **It can not control rotational deformity, anterior spinal growth continues and deformity progresses**
- **Curve control is difficult especially in kyphoscoliosis and in sagittal plane.**
- **High complication rate (%58 Akbarnia 2010 JBJS)**



# Growing Rod with Multisegment fixation



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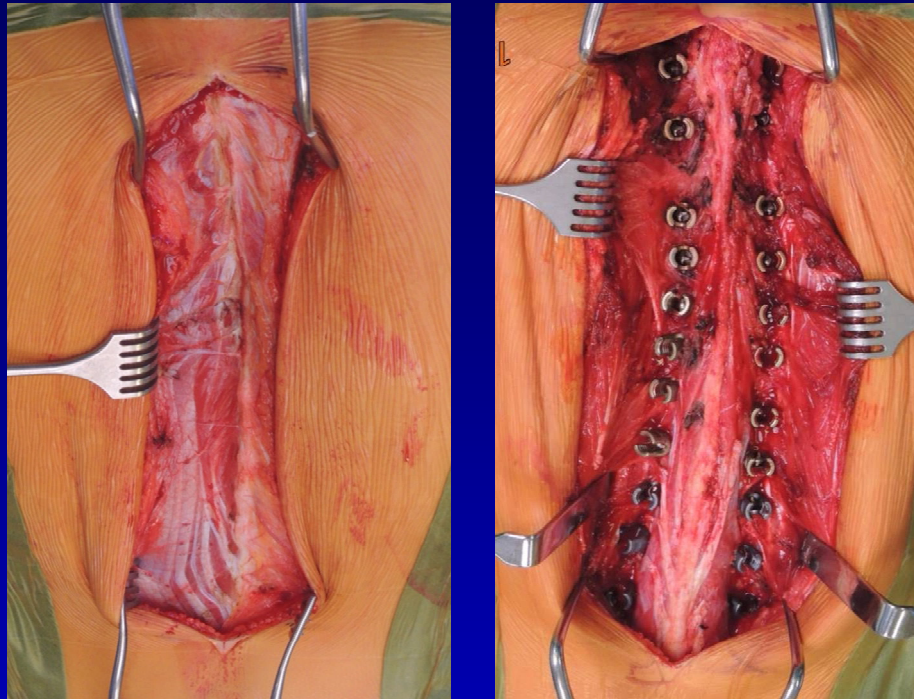
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TRAUMATOLOGY 2013

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

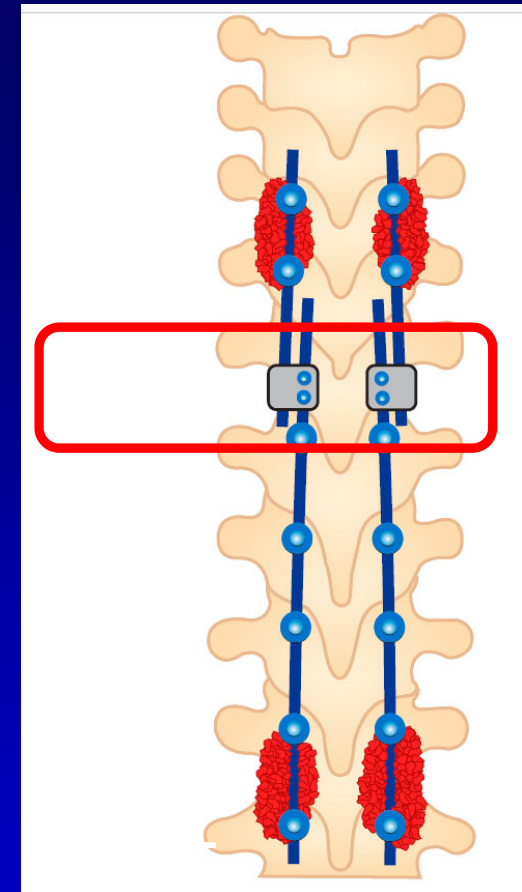
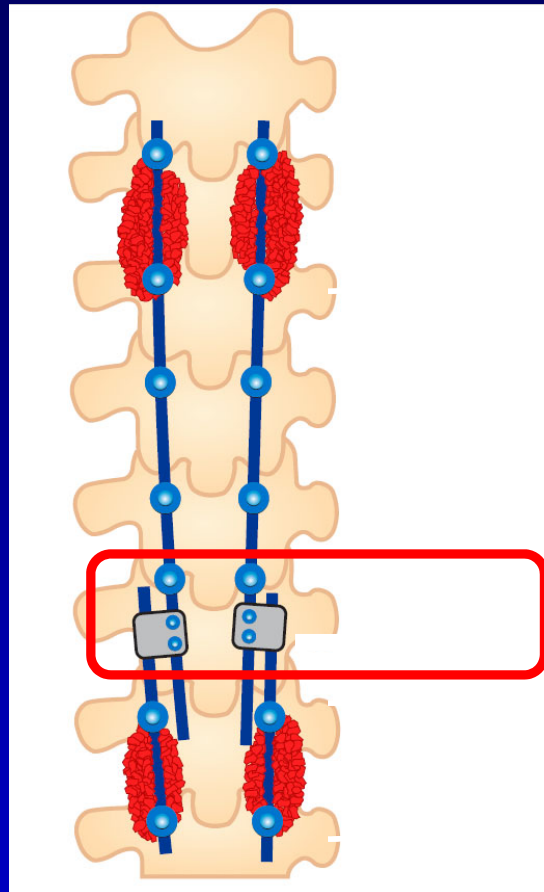
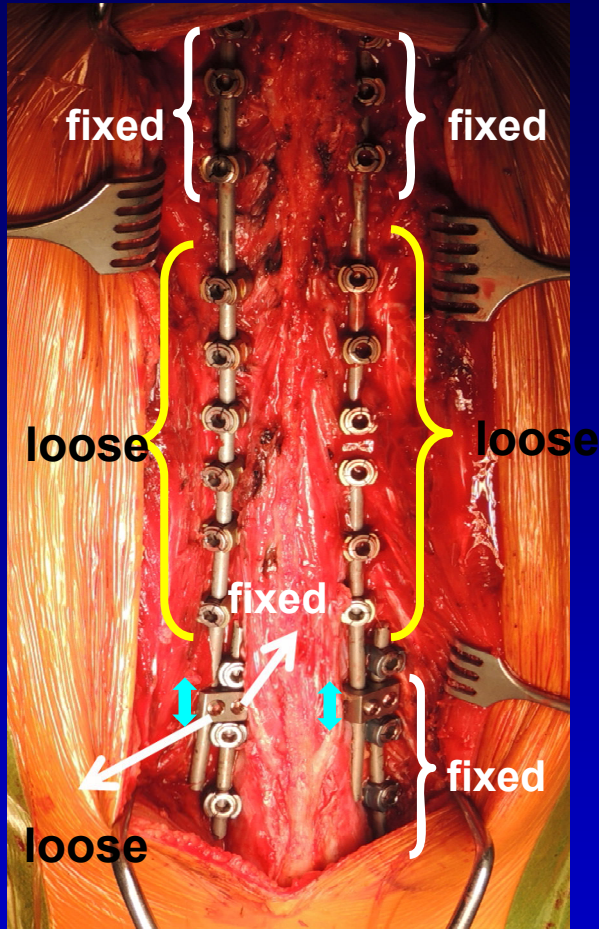
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Azmi Hamzaoglu MD

## *Surgical Technique*



- ✓ After skin-subcutaneous dissection, placement of polyaxial pedicle screws into the strategic vertebrae under flourosopic guidance with muscle sparing technique.
- ✓ Depending on the size of the child, it can be performed with any cervical or pediatric instrumentation system.

## 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

# PURPOSE

- To evaluate clinical ,radiological and pulmonary functions outcomes of EOS patients whom treated with **Sliding-Growing Rod Technique**



# **MATERIAL & METHODS**

- **Retrospectively reviewed data base**
- **Inclusion Criteria :**
  - **EOS patients treated with sliding–growing rod tech.**
  - **Have complete preop and final EOS images**
  - **Have preop and final f/up pulmonary function tests**
  - **Complete hospital records for complications**
  - **Minimum 2 years follow up**

# MATERIAL & METHODS

- ✓ 16 (10F/6M) pts with EOS were evaluated
- ✓ Mean age of 6.7 (5-10)
- ✓ Preop, postop, f/up standing AP/L EOS images were measured
  - (1) Curve correction
  - (2) Spinal length achieved
- ✓ Calculation of prevented *lengthening procedures*
- ✓ Compared improvement of pulmonary functions

# RESULTS

✓ The mean follow-up period was 30,6 months (24-45).

	Pre-op	Latest Follow-up
(MT) curve	56,9° (38 - 89)	13,5° (5 - 59)
(TL/L) curve	43,2° (12 - 8)	15,5° (3 - 54)
T2-T12 Kyphosis	34,4° (4 - 66)	33,4° (20 - 46)
Lumbar Lordosis	56,4° (27 - 70)	57° (42 - 70)

T1-T12 Length → 0,85 mm / per month

T1- S1 Length → 1,23 mm / per month



# RESULTS

- ✓ No patient had neurological impairments.
- ✓ *There was no rod breakages or other implant failure* and wound problems
- ✓ The most common postop radiological finding is dislodgement of non-locked set screws mainly at the apical region concave side (in 5 pts).
- ✓ Two pts had corection loss ( %12,5)
- ✓ *This technique prevented 59 repeated planned lengthening procedures (COST EFFECTIVE !!)*



# RESULTS

➤ % predicted FVC of 74 improved to 86

➤ % predicted FEV1 of 81 improved to 88

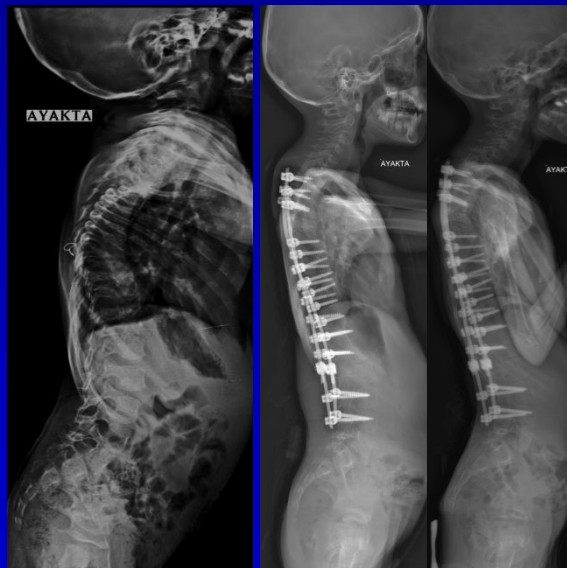
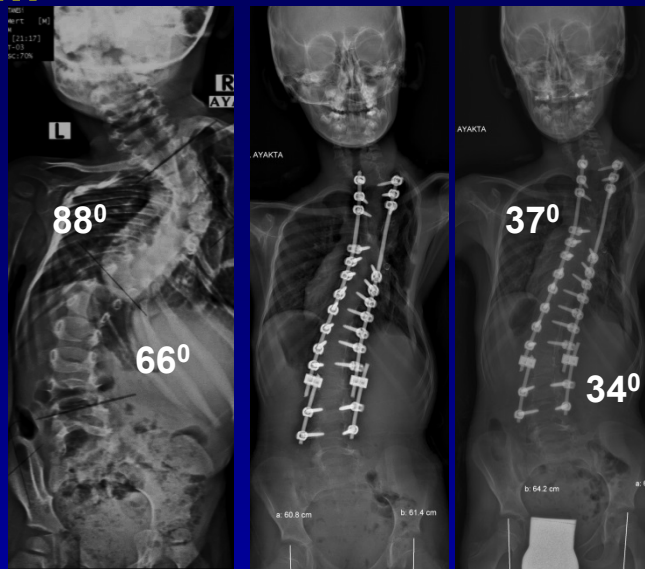
	Birim		Öngörülen	Önce	%Pred.
VC	l	(2)	2,35	1,88	80%
TV	l	(5)	0,42	0,37	87%
ERV	l	(2)	0,76	0,59	77%
FVC	l	(35)	2,35	1,88	80%
FEV1	l	(35)	2,06	1,66	81%
FEV1/FVC	%	(35)	89	96	108%
FEV1/VC	%	(5)	85	88	104%
PEF	l/s	(2)	5,49	2,73	50%
MEF75	l/s	(2)	3,98	2,58	65%
MEF50	l/s	(2)	3,09	2,23	72%
MEF25	l/s	(35)	1,24	1,43	115%
tex	s			2,7	

**Pre-op**

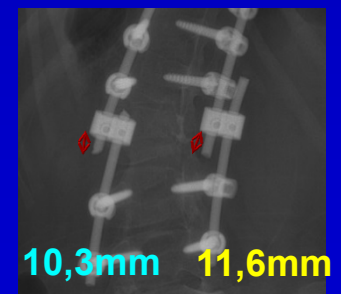
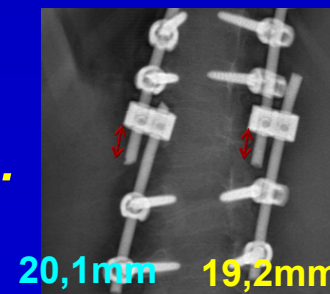
	Birim		Öngörülen	Önce	%Pred.
VC	l	(2)	2,51	2,15	85%
TV	l	(5)	0,42	0,66	155%
ERV	l	(2)	0,76	1,42	187%
FVC	l	(35)	2,51	2,15	85%
FEV1	l	(35)	2,23	2,02	90%
FEV1/FVC	%	(35)	89	94	105%
FEV1/VC	%	(5)	85	94	111%
PEF	l/s	(2)	5,49	3,93	72%
MEF75	l/s	(2)	3,98	3,93	99%
MEF50	l/s	(2)	3,09	2,92	95%
MEF25	l/s	(35)	1,39	1,71	123%
tex	s			3,6	

**26 m Follow-up**

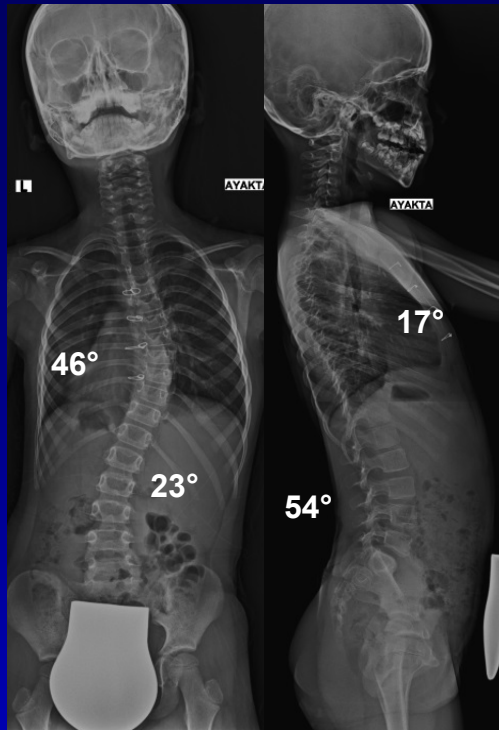
# EMO, M, 2y1m



- Increase in length was 0,78 mm per month.
- T1-S1 height was 0,81 mm per month



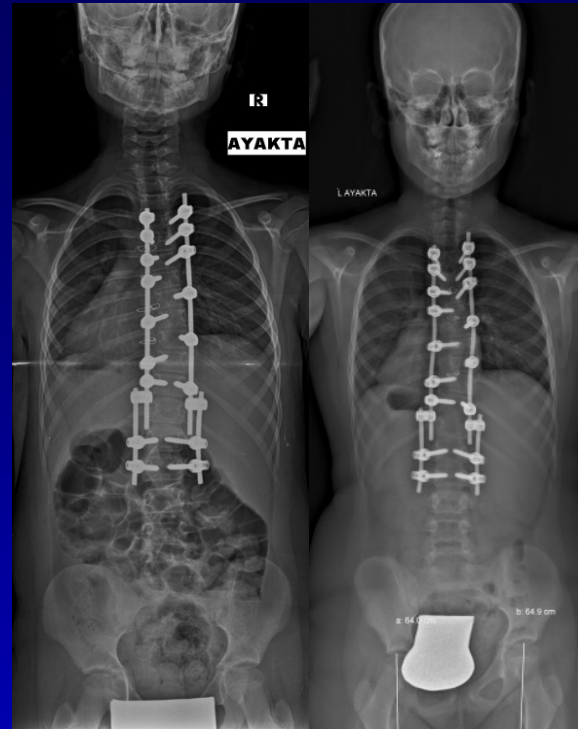
**SG, F, 6Y**



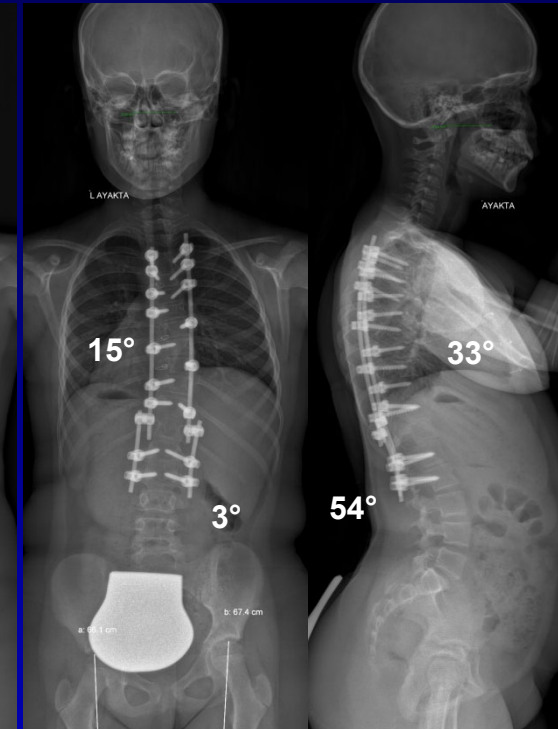
Pre-op



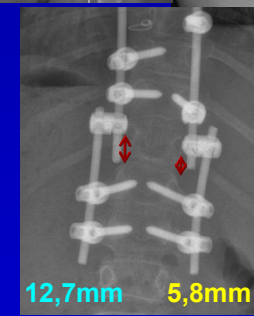
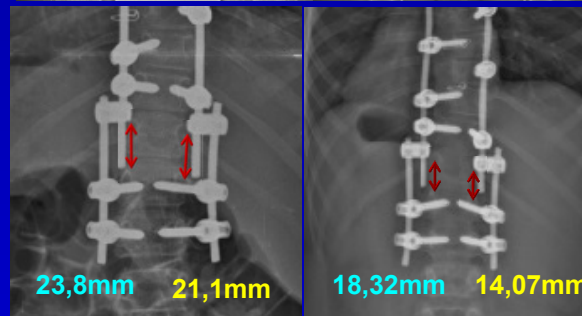
Pre-op



Early Post-op



24 month

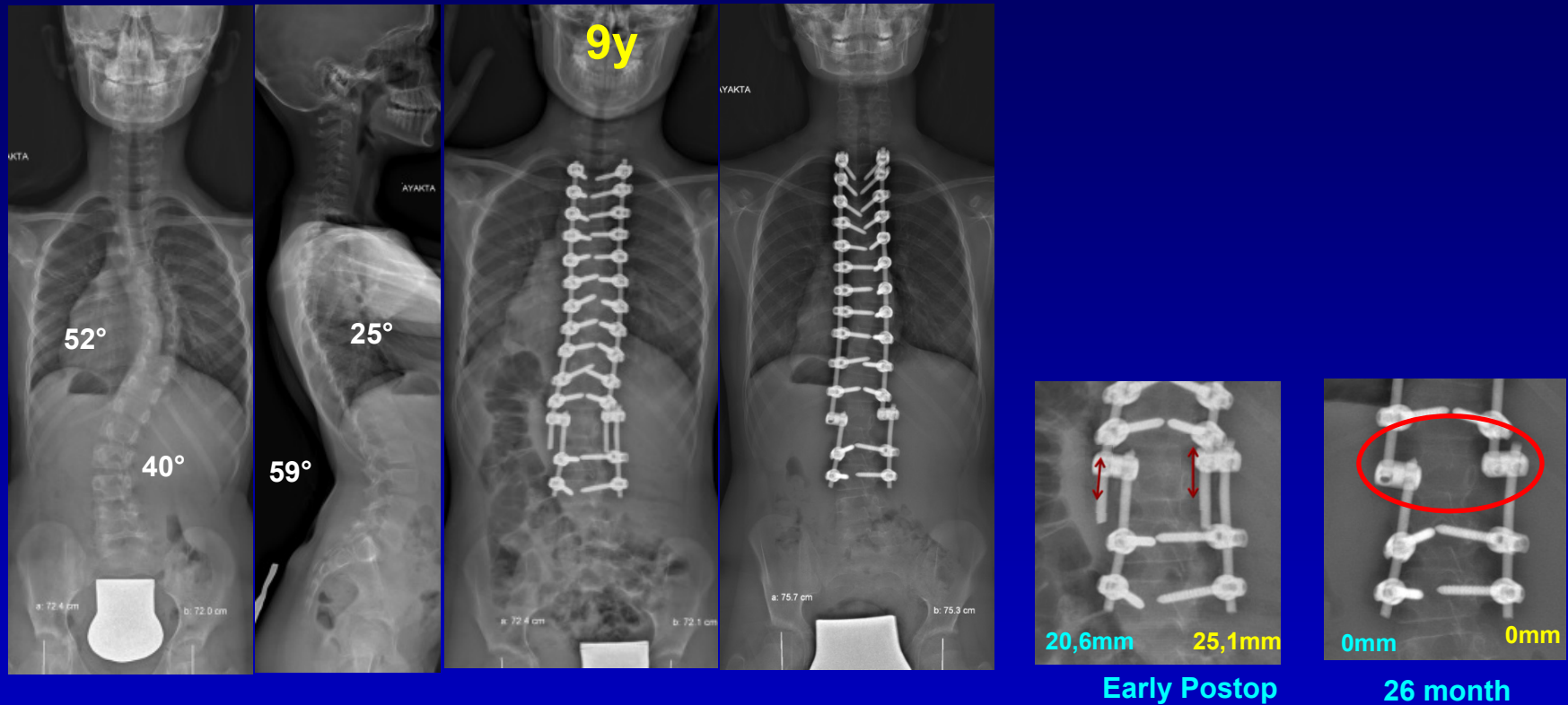


➤ **T1-S1 length grew height 13,4 mm (Early Postop – 24 month)**

➤ **T1-S1 height was 0,83 mm per month**



**SD, F, 9y**



- ***Increase in length was 1,56 mm per month.***
- ***T1-S1 height was 1,6 mm per month***

# CONCLUSION

## Sliding Growing Rod Technique;

- ✓ Provides a **dynamic fixation** which allows self growing of spine
- ✓ Maintains correction in both planes and rotational stability
- ✓ Avoides spontaneous fusion and multiple lengthening
- ✓ Improves pulmonary functions
- ✓ Can be performed with **any regular instrumentation system.**

**THANK YOU**