

# SLIDING-GROWING ROD TECHNIQUE FOR MANAGEMENT OF EARLY-ONSET SCOLIOSIS

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## Paper # 3 SLIDING-GROWING ROD TECHNIQUE FOR MANAGEMENT OF EARLY-ONSET SCOLIOSIS

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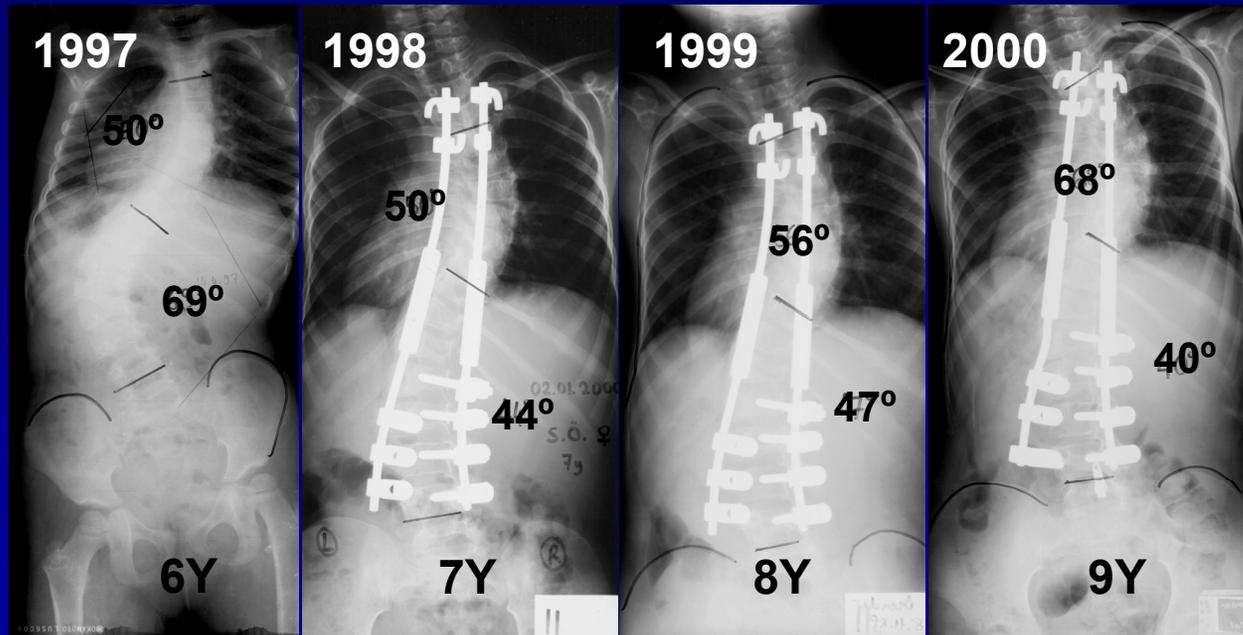
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# BACKGROUND

- ✓ The main goal of treatment is to obtain and maintain curve correction while simultaneously preserving spinal, trunk, and lung growth.
- ✓ Growing rods have become increasingly popular in the treatment of early-onset scoliosis.

## *Problems with traditional growing rods systems*



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

## ***Problems with traditional growing rods systems***

- ✓ **Curve control is especially difficult in kyphoscoliosis.**
- ✓ **Curve control is also difficult in sagittal plane.**
- ✓ **Requires repeated lengthening procedures.**
- ✓ **T1-S1 length achieved after every lengthening procedure decreases with each subsequent lengthening and over time (Law of diminishing).**
- ✓ **Prolonged instrumentation and repeated lengthenings can result with autofusion.**

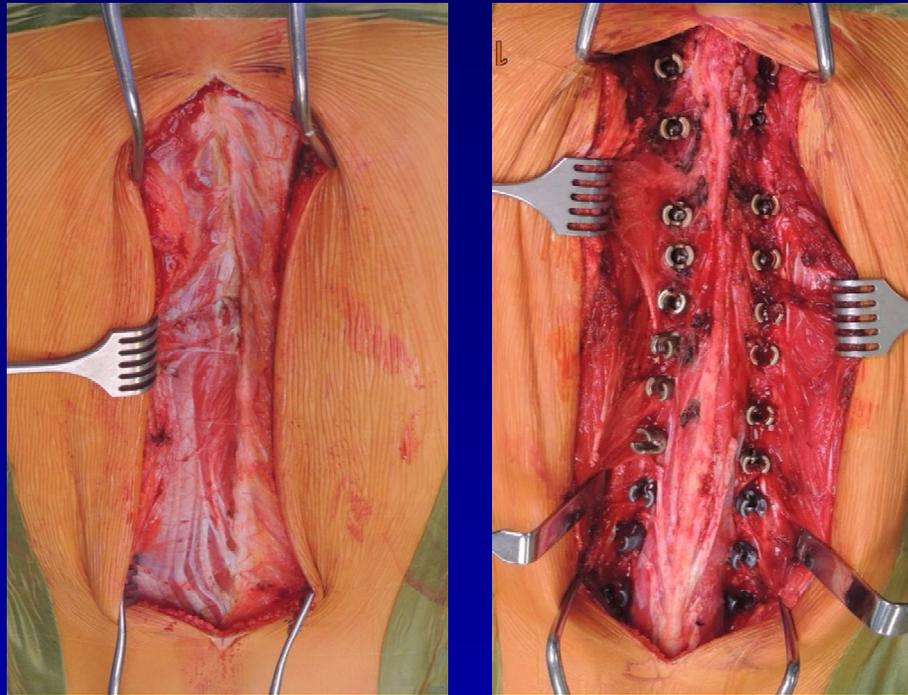
# PURPOSE

## ➤ *Using apical and intermediate anchors*

- ✓ provide better correction and control of the main curve in both coronal and sagittal plane,
- ✓ prevent progression of deformity,
- ✓ decrease implant-related complications,
- ✓ decrease number of repeated lengthenings,
- ✓ decrease rate of spontaneous fusion
- ✓ can be performed with regular instrumentation system,

***We tried to develop a dynamic fixation system instead of static fixation system.***

## ***Surgical Technique***

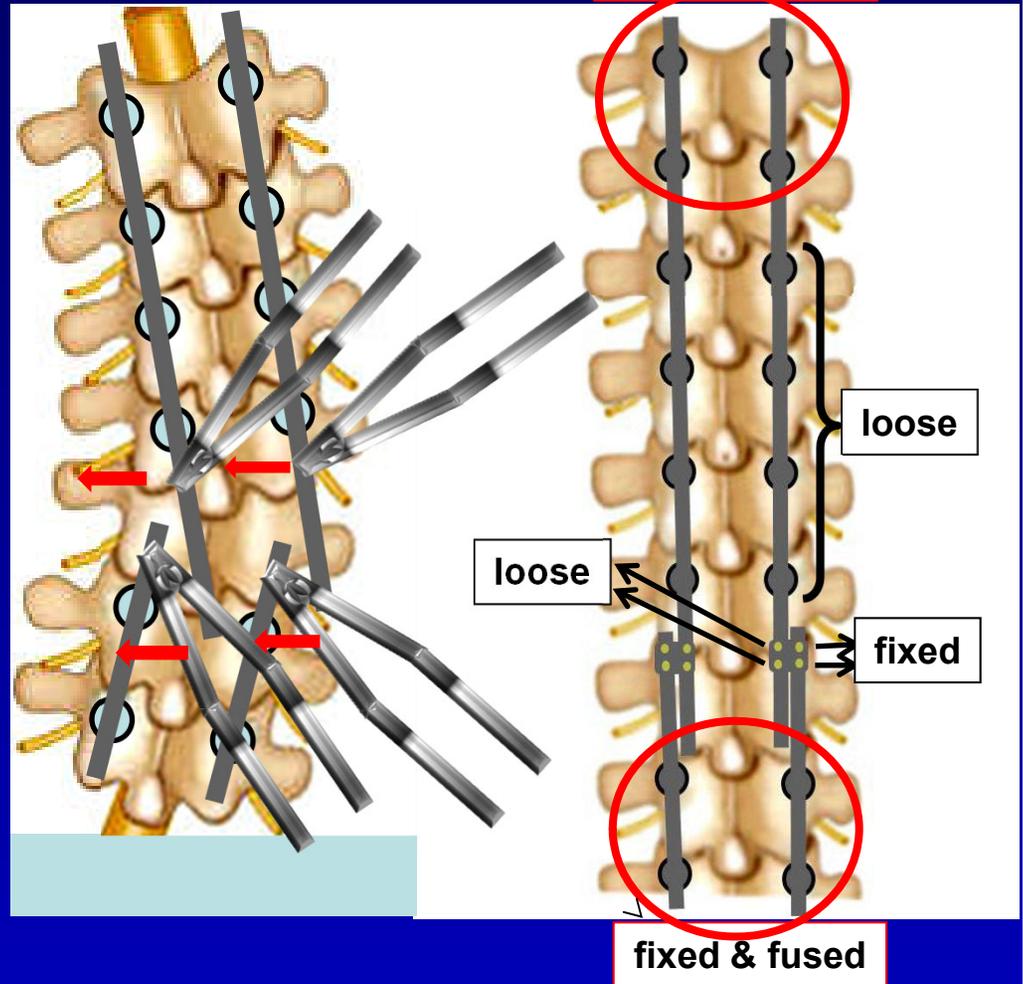
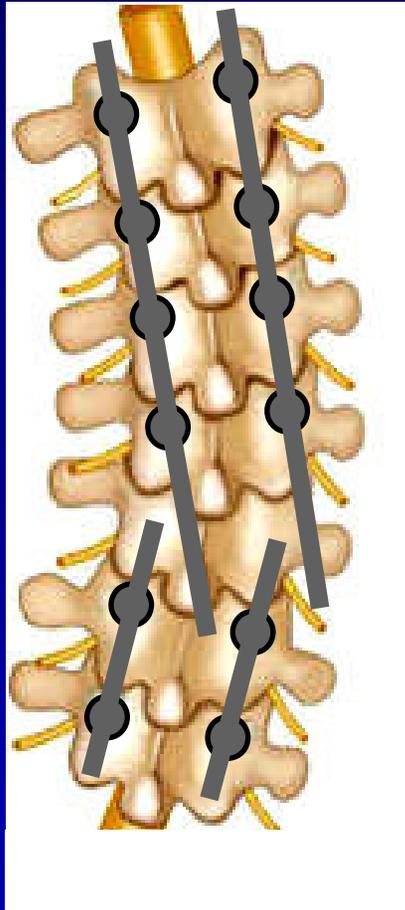
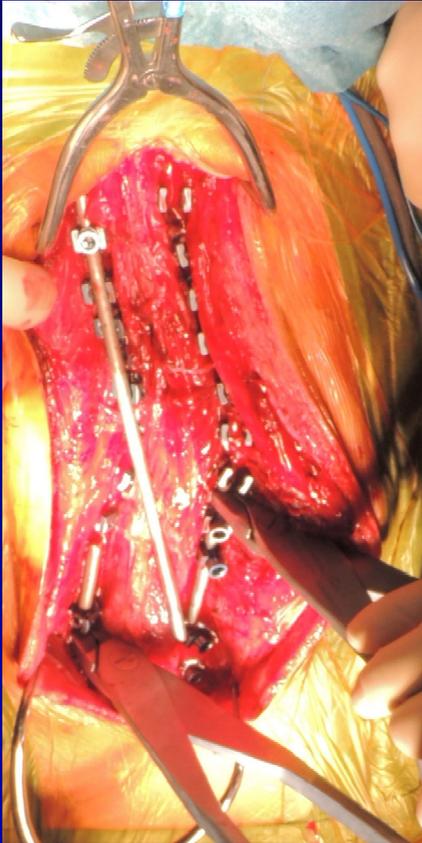


- ✓ **After skin-subcutaneous dissection, placement of polyaxial pedicle screws into the strategic vertebrae under flourosopic guidance with muscle sparing technique.**
- ✓ **Recently robotic assistance is being used to decrease radiation exposure related to floroscopy.**
- ✓ **Depending on the size of the child, it can be performed with any cervical or pediatric instrumentation system.**

## *Surgical Technique*

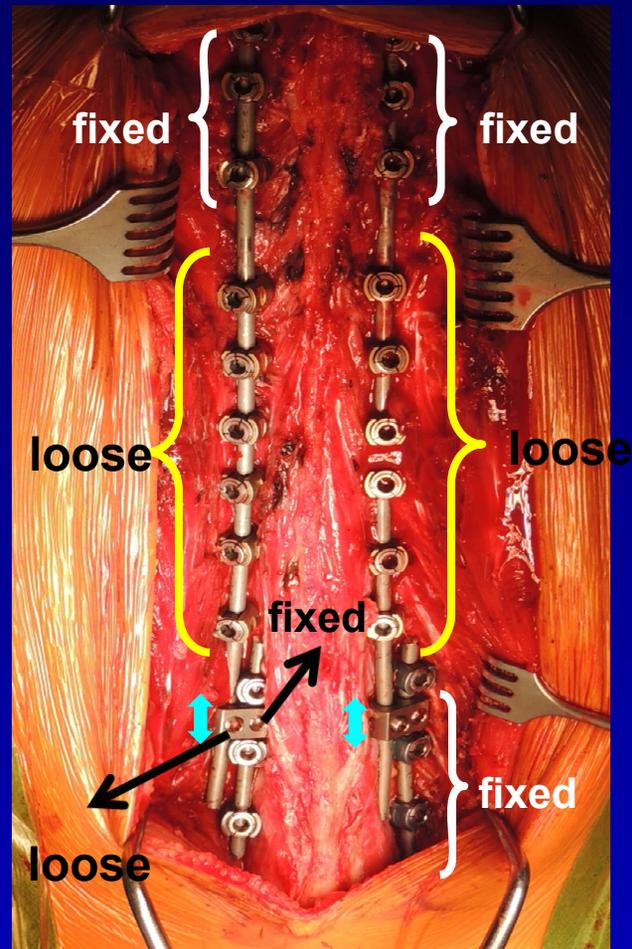


- ✓ **Use of skull (J-Tongue) – femoral traction application for the initial procedure provides more flexibility, decreases the need for forceful correction maneuvers on immature spine and prevents possible implant failures.**



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

## Surgical Technique



- ✓ Domino connectors were placed generally at the lumbar region.
- ✓ Fixation of most proximal and most distal screws
- ✓ The rest of the screws have non-locked set-screws

# MATERIAL & METHODS

- ✓ 11 (6F/5M) patients with early onset spinal deformities with a mean age of 5.8 (3-10) were evaluated.
- ✓ Preop, postop, f/up standing AP/L images with EOS were reviewed for radiological data.
- ✓ The results of patients treated with this technique for early onset spinal deformities with > 1 year follow-up was evaluated with respect to ;
  - (1) curve correction;
  - (2) spinal length achieved;
  - (3) complications;
  - (4) number of procedures performed with the new approach.

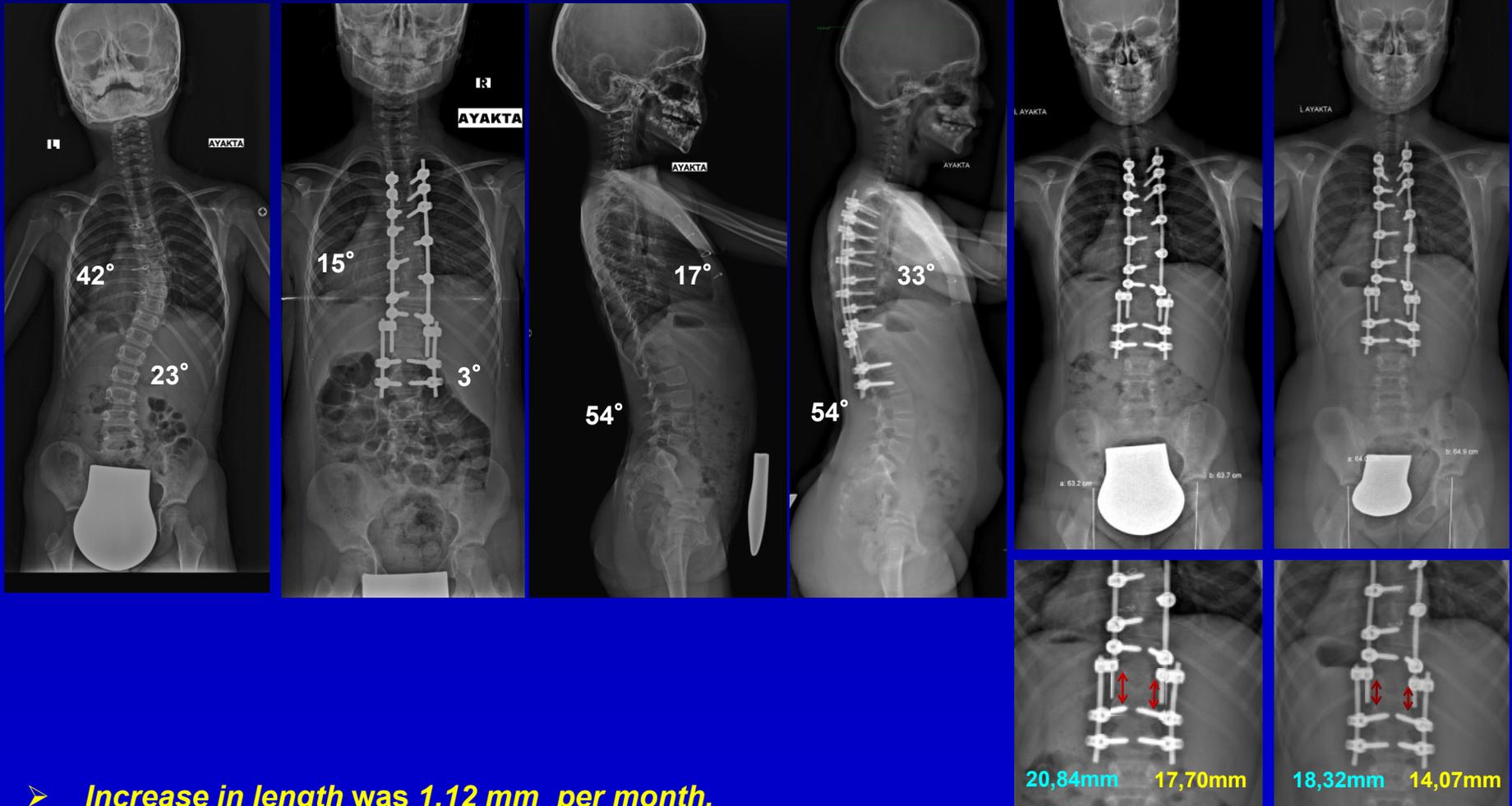
# RESULTS

- ✓ The mean follow-up period was 14.8 months (12-19 months).
- ✓ Preop (MT) curve of  $58.7^{\circ}$  ( $38^{\circ}$  -  $89^{\circ}$ )  $\longrightarrow$   $24.5^{\circ}$  ( $5^{\circ}$  -  $59^{\circ}$ )
- ✓ Preop (TL/L) curve of  $43.4^{\circ}$  ( $12^{\circ}$  -  $88^{\circ}$ )  $\longrightarrow$   $16.4^{\circ}$  ( $3^{\circ}$  -  $54^{\circ}$ )
- ✓ Preop (TK) of  $35.1^{\circ}$  ( $4^{\circ}$  -  $66^{\circ}$ )  $\longrightarrow$   $29.4^{\circ}$  ( $20^{\circ}$  -  $46^{\circ}$ )
- ✓ Preop (LL) of  $55.3^{\circ}$  ( $4^{\circ}$  -  $89^{\circ}$ )  $\longrightarrow$   $55.7^{\circ}$  ( $31^{\circ}$  -  $70^{\circ}$ )

# RESULTS

- ✓ *The mean increase in length was 1.14 mm (0.7-1.41 mm) per month.*
- ✓ *The mean increase in T1-S1 height was 1.28 mm per month.*
- ✓ The mean number of pedicles screws placed segments were 13,6 (12-16).
- ✓ No patient had neurological impairments.
- ✓ *There was no rod breakages or other implant failure and wound problems treated without surgery.*
- ✓ The most common postop radiological finding is dislodgement of non-locked set screws mainly at the apical region (in 3 patients).
- ✓ *This modification prevented 22 repeated planned lengthening procedures.*

**SG, F, 6Y**

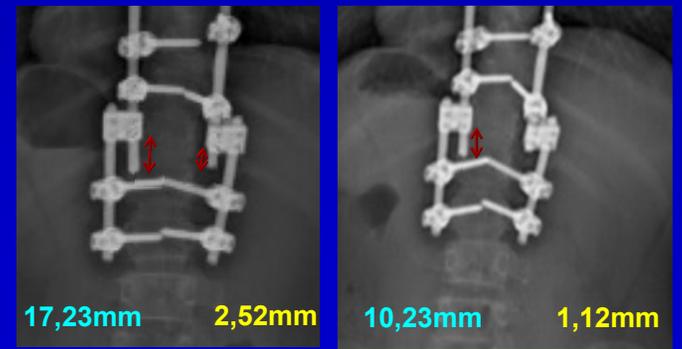
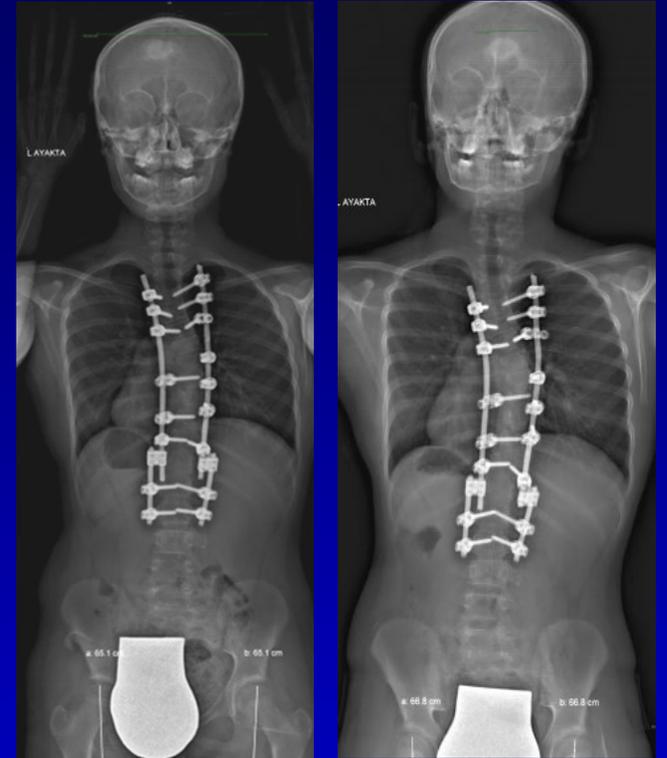
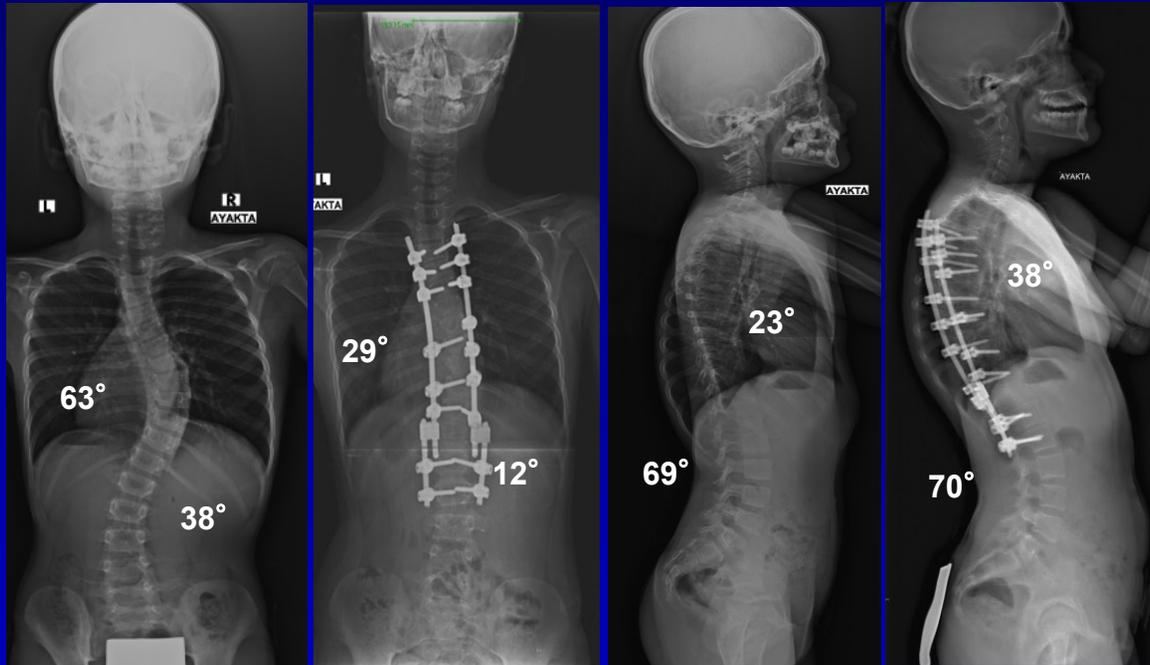


➤ **Increase in length was 1.12 mm per month.**

➤ **T1-S1 height was 1.63 mm per month**

**Average 3,1mm in three months**

**SK, F, 9Y**

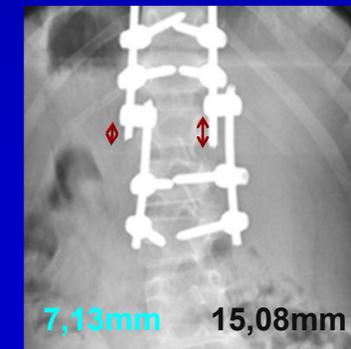
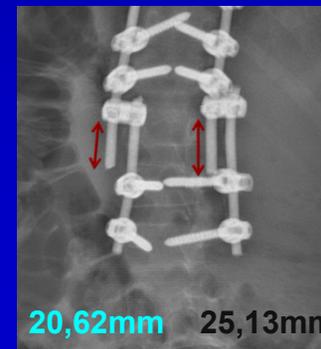
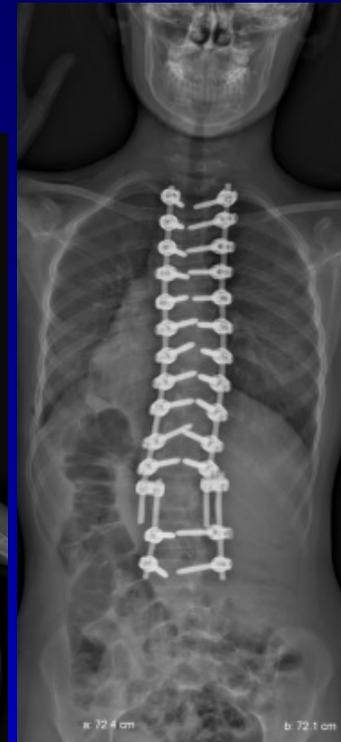
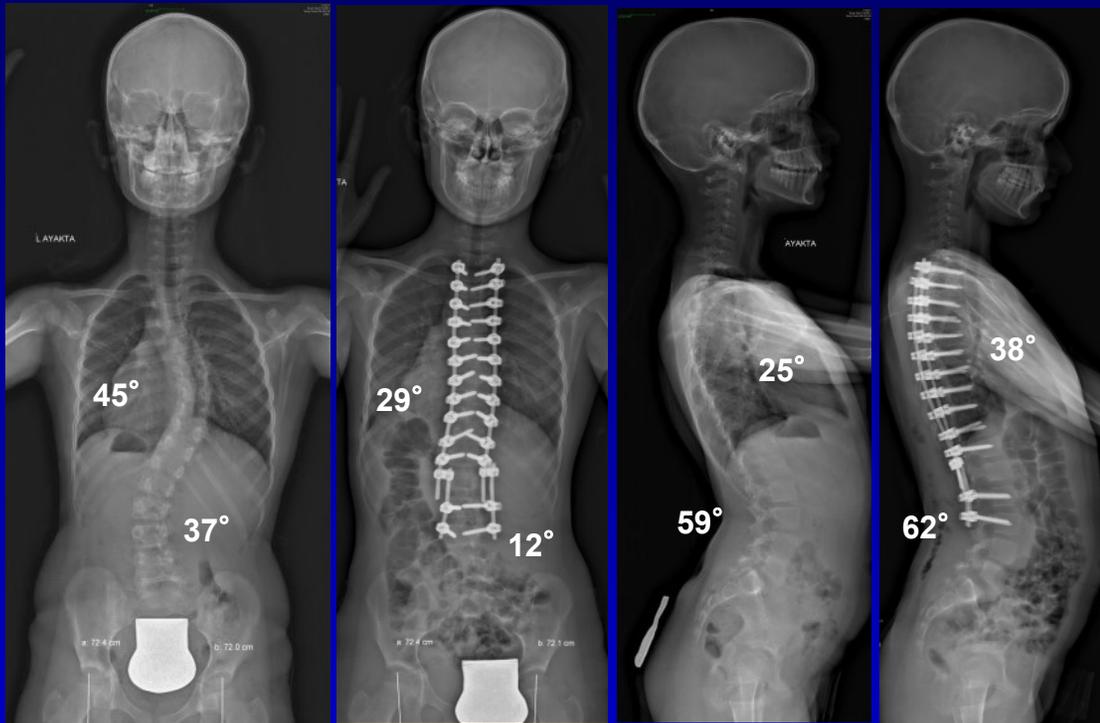


➤ Increase in length was 1.03 mm per month.

➤ T1-S1 height was 1.82 mm per month

Average 2,45mm in three months

**SD, F, 10Y**

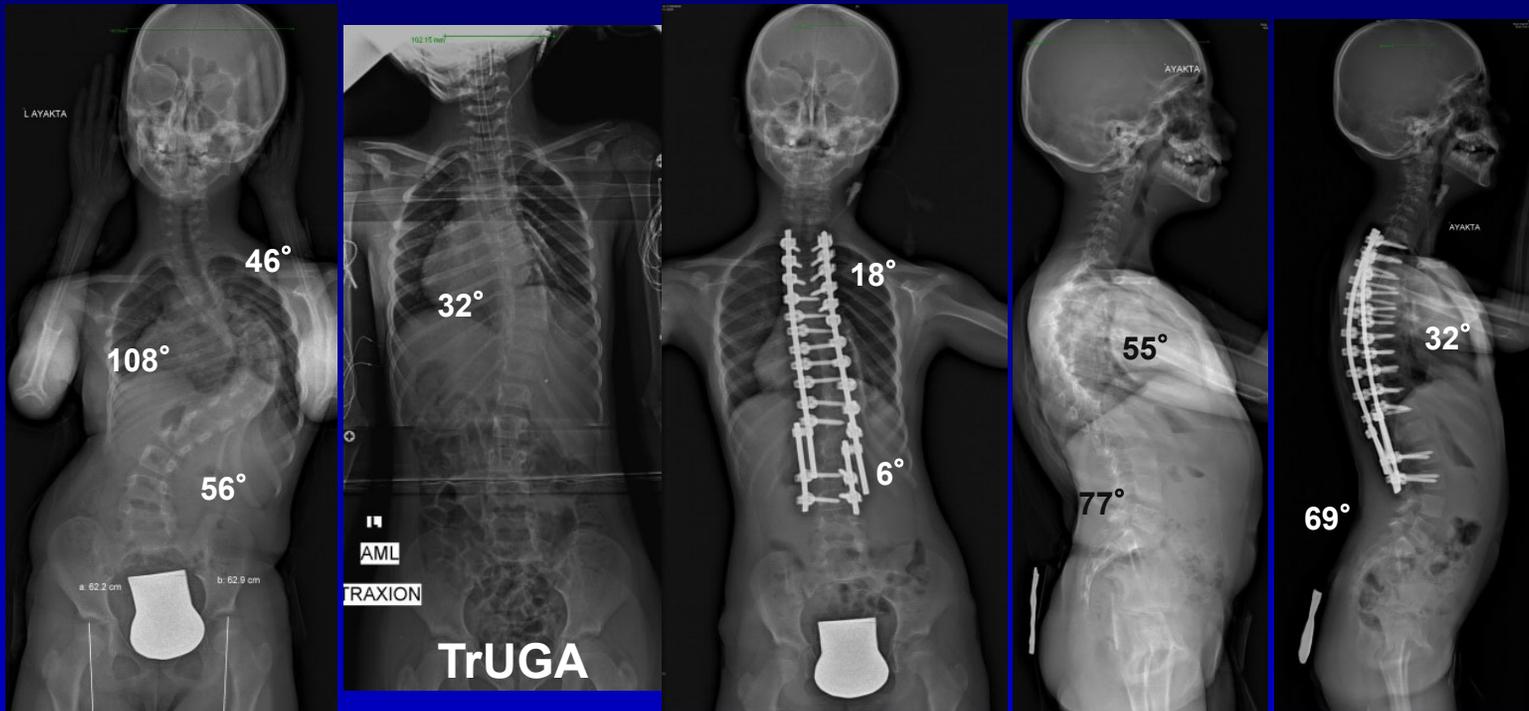


➤ **Increase in length was 1.31 mm per month.**

➤ **T1-S1 height was 1.49 mm per month**

**Average 3,9mm in three months**

# SA, F, 9Y



- *TrUGA showed more than %70 flexibility .*
- *This patient was treated with sliding –growing rod technique instead of apical vertebral resection.*

# CONCLUSION

- ✓ Our new treatment strategy provides that the screws in apical, intermediate and strategic vertebra controlled the curve, prevents progression, maintains rotational stability and allows continuation of trunk growth.
- ✓ Depending on the size of the child, it can be performed with any regular instrumentation system.

# CONCLUSION

- ✓ **Sliding-growing rod technique is a dynamic fixation technique which prevents multiple lengthening procedures.**
- ✓ **Short term results showed that sliding-growing rod technique works and allows spinal growth with low complication rate.**
- ✓ **Larger series and longer follow-up will provide more data about this system.**
- ✓ **Robotic assistance for pedicle fixation will decrease radiation exposure related to fluoroscopy.**

**THANK YOU!**

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