

Introduction of Shilla surgery into Japan

A report on the first 22 patients



National Hospital Organization
Kobe Medical Center



Teppei Suzuki, Koki Uno

Disclosure

Author	Relationships Disclosed
Teppei Suzuki	No Relationship
Koki Uno	DePuy Spine (b)

- (a) Grants/Research Support
- (b) Consultant
- (c) Stock/Shareholder
- (d) Speakers' Bureau
- (e) Other Financial Support



Introduction

EOS (Early-onset scoliosis)

Severe deformity

TIS (Thoracic insufficiency syndrome)



Life threatening
health risk

Campbell; *JBJS*, 2003

Davies; *Arch Dis Child*, 1971

Limited Fusion

(Apical fusion, wedge resection, etc)

Fusionless treatment

Distraction based (Growth sparing)

Growing Rod

VEPTR

Growth guidance

Luque

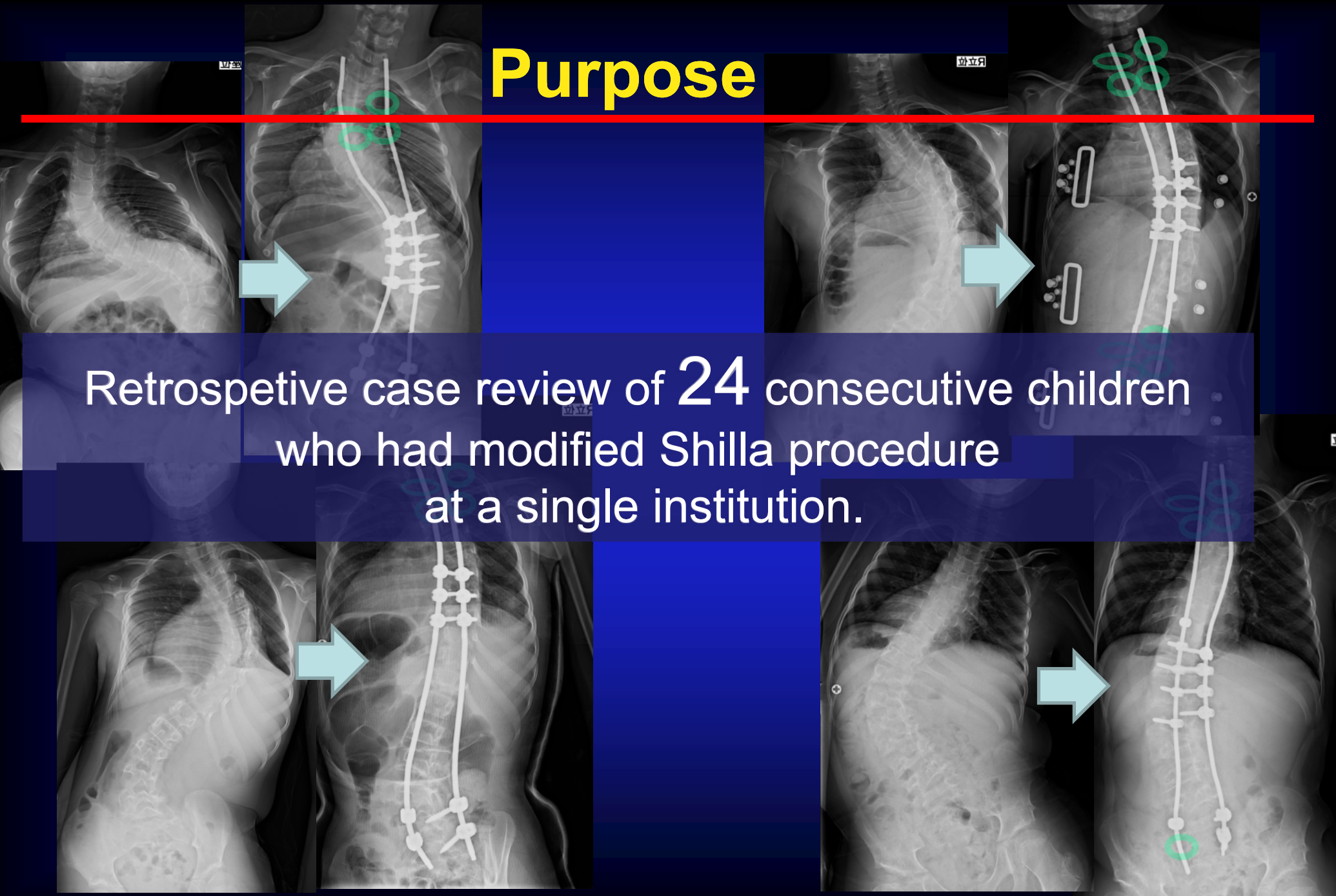
Stapling

Shilla

McCarthy; *ICEOS*, 2008

Purpose

Retrospective case review of 24 consecutive children who had modified Shilla procedure at a single institution.



Objects

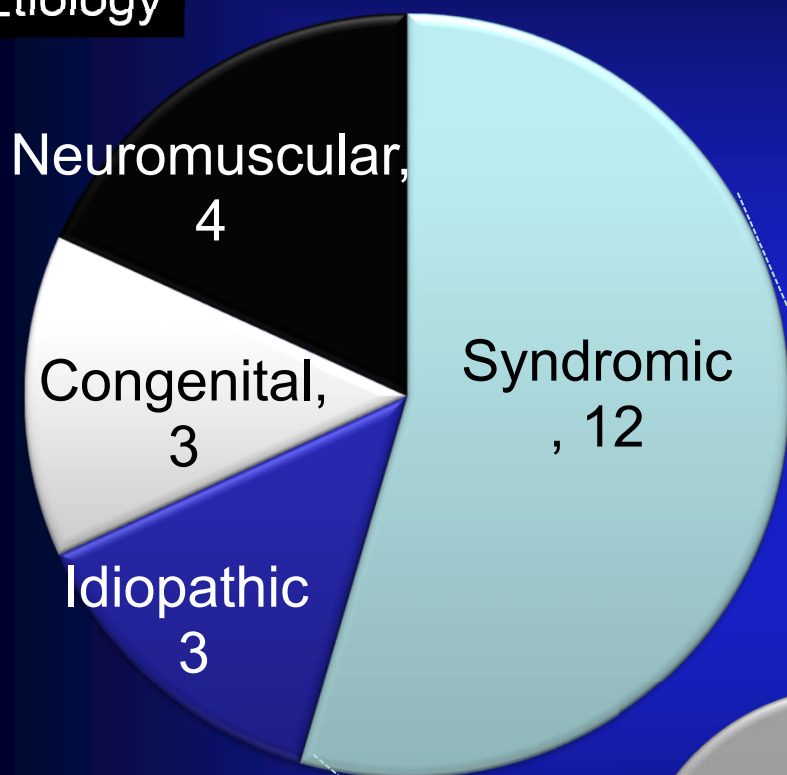
No. of patients	22
Gender (F:M)	13:9
Age at the initial surgery	8.5 \pm 2.3y.o.
Follow-up	3.1 \pm 1.6yrs



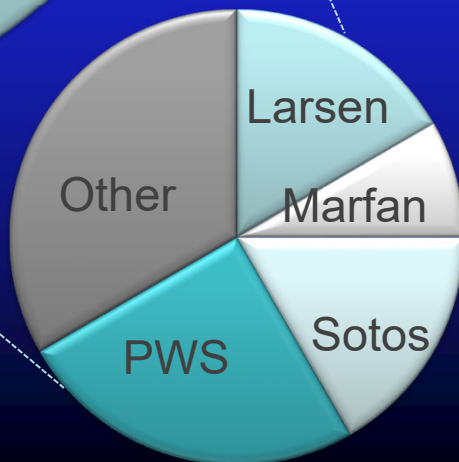
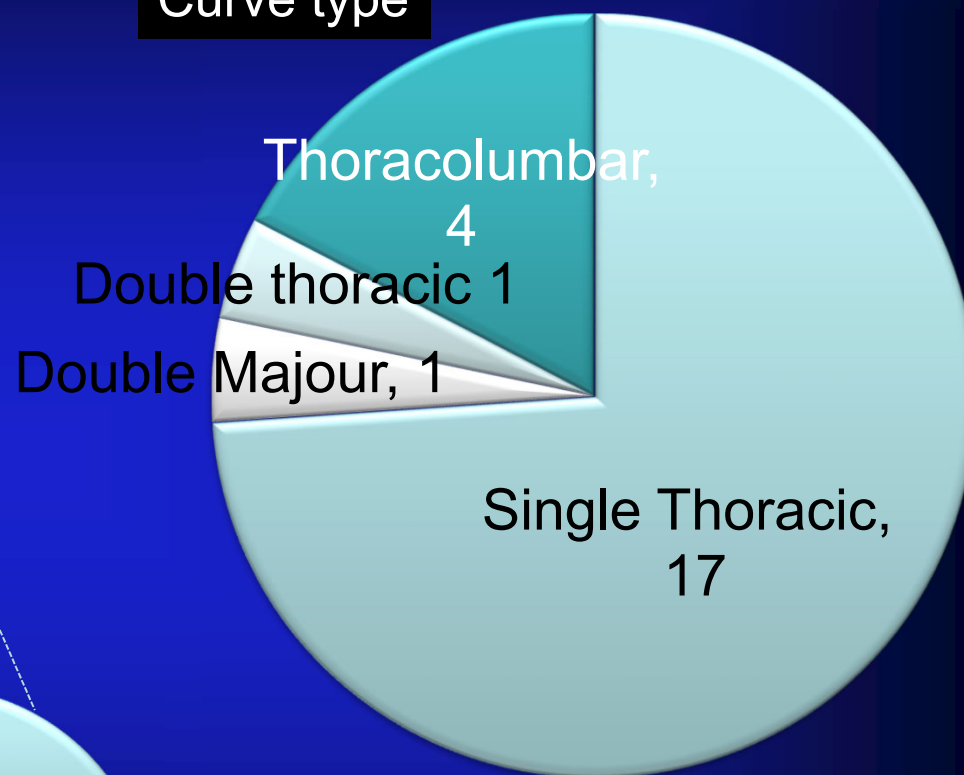
4 patients had definitive fusion

Objects

Etiology



Curve type



Modified Shilla procedure

Cephalad anchor
Extraperiosteal
placement

Sliding screw
or/and
Sublaminar wire
With HDPE cable

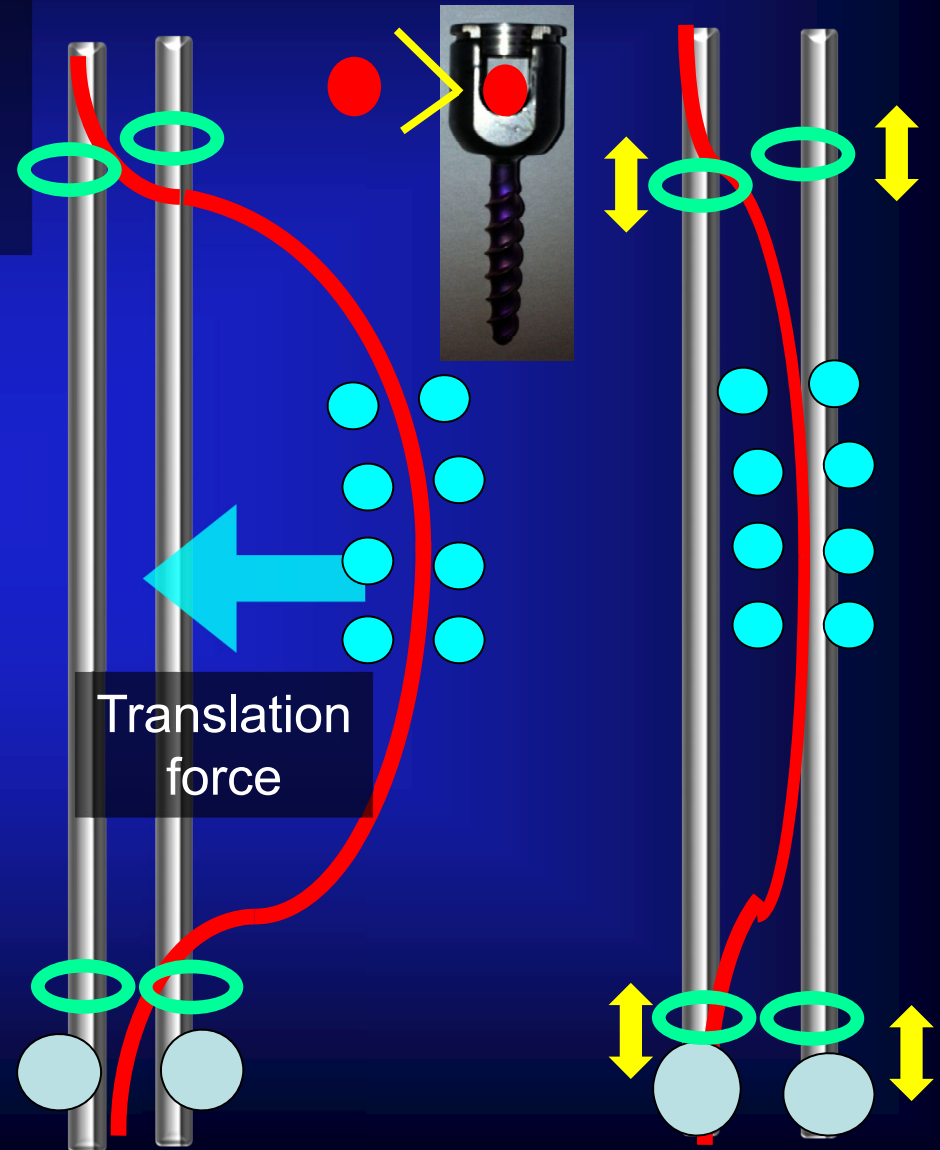
Apical
fusion

3-5 vertebrae
With pedicle screw
With Ponte osteotomy

Caudal anchor
Extraperiosteal
placement

Sliding screw
or/and
Sublaminar wire
With HDPE cable

HDPE: High-density polyethylene



Measurement

Preinitial → Postinitial → Final f/u

Major Curve

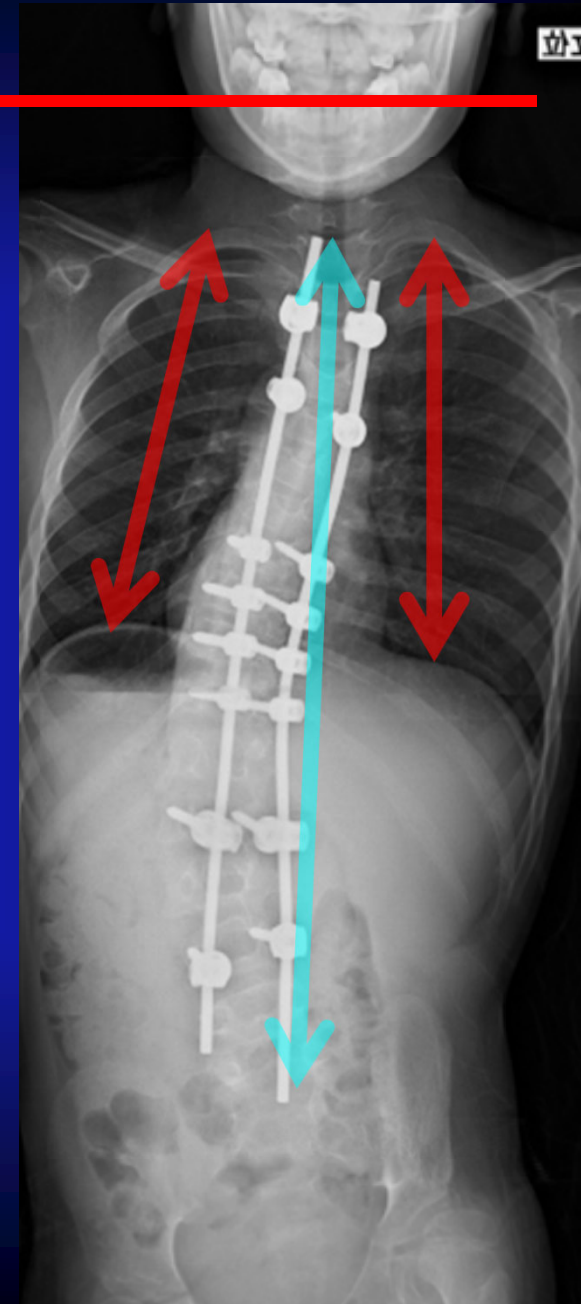
Kyphosis (T1-5 T5-12)

T1-S1 Length

SAL

Concave & Convex

Complications



Coronal parameter

Degree

100

P<0.01

P<0.01

P<0.01

Initial Correction Rate

$48 \pm 12\%$

86

64

44

50

44

29

39

Lumbar

43

38

Upper thoracic

22

0

Preinitial

Postinitial

FFU

Shilla

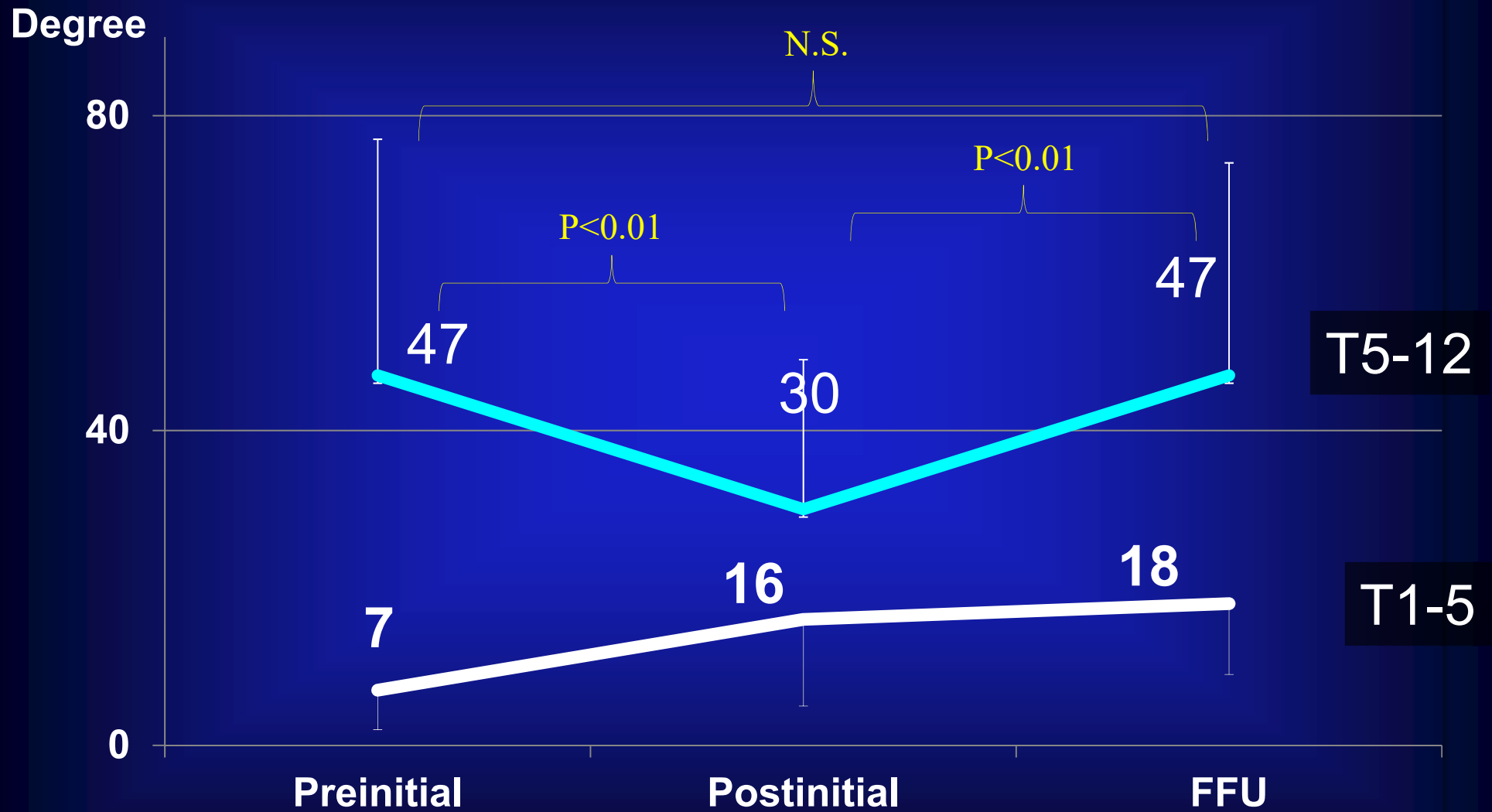
Main thoracic

Coronal parameter

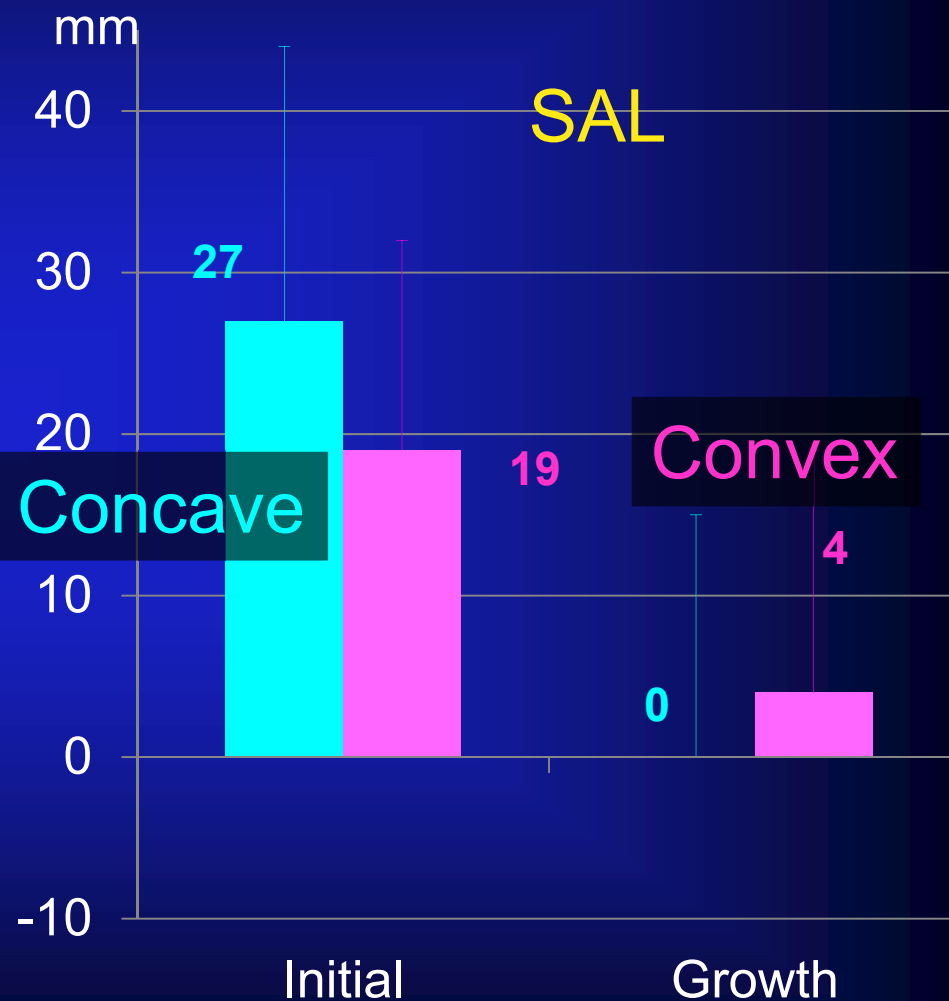
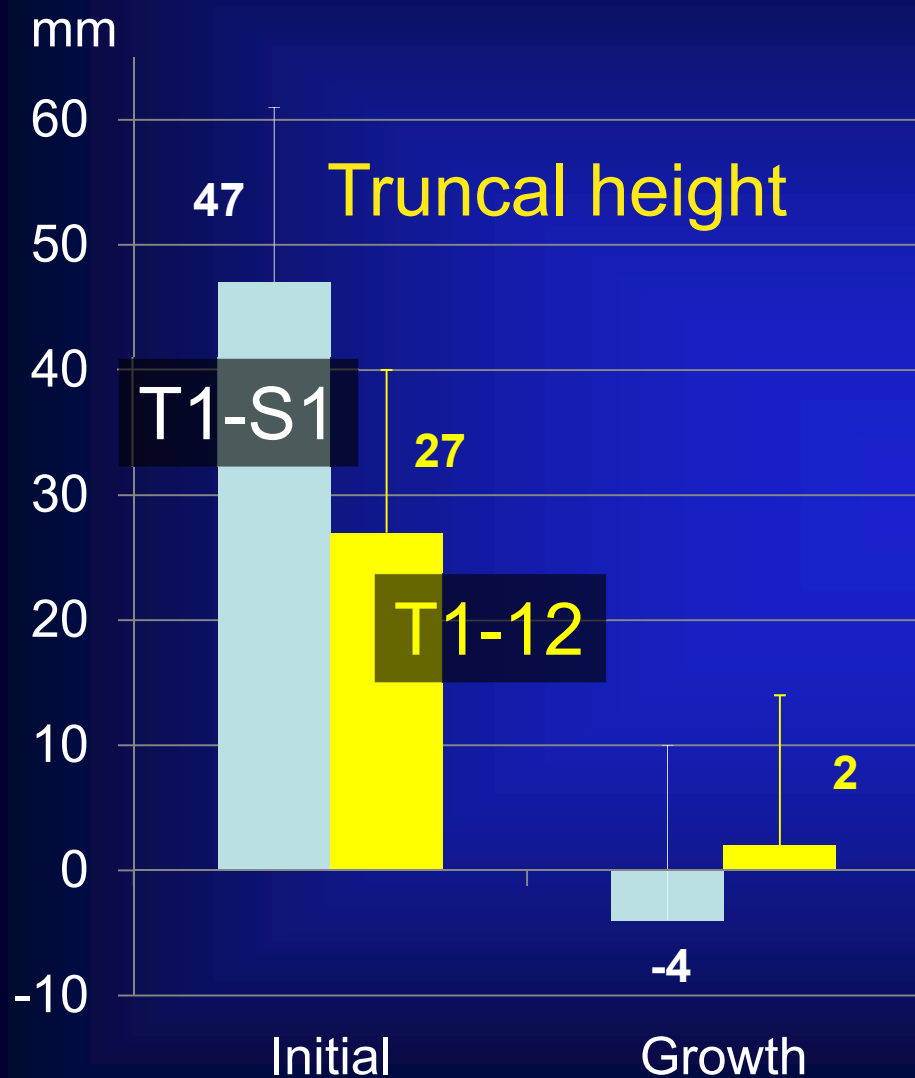
Degree



Thoracic kyphosis

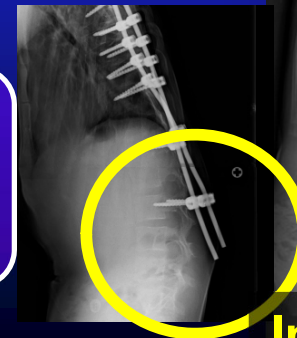
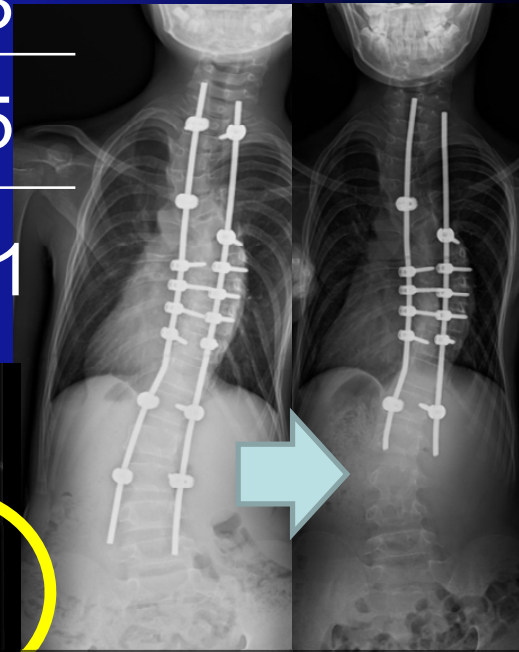


Length of elongation



The detail of the complications

No.		Detail		
18 Pts (82%)	30 complications	Dislodgement	Cephalad	8
			Pull-out	Caudal
		Infection		3
		Breakage		3
		Cephalad anchor		5
9 Pts (41%)	16 Unplanned surgeries	Caudal anchor		11

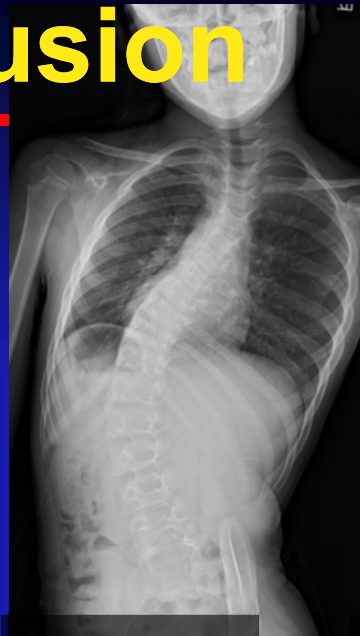


Implant prominence

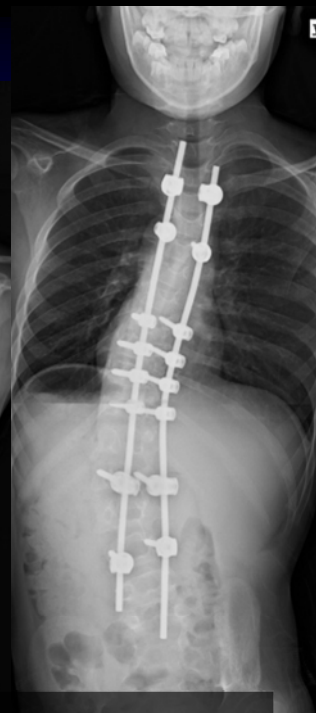
Almost all unplanned surgeries consisted of partial removal of implant prominence.

Definitive Fusion

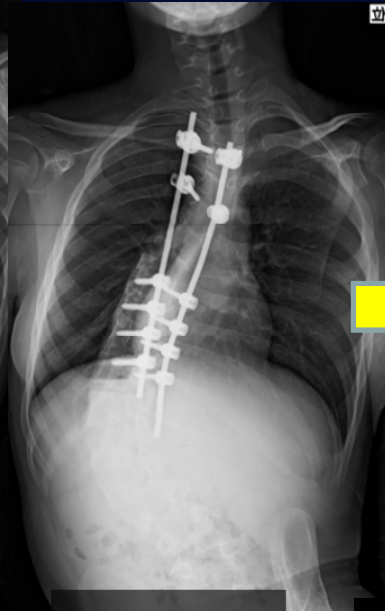
Drastic correction of lumbar curve is possible at the definitive surgery.



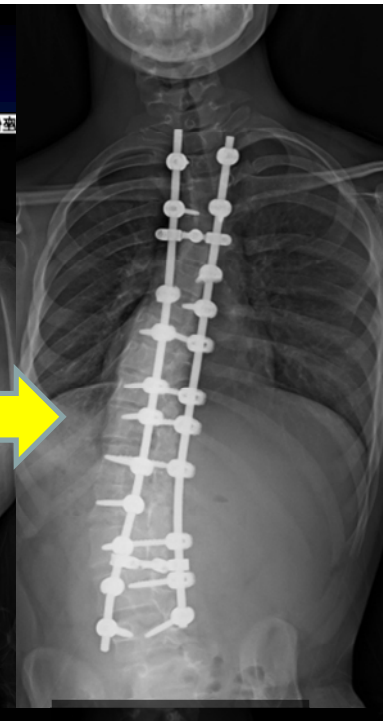
Pre-initial



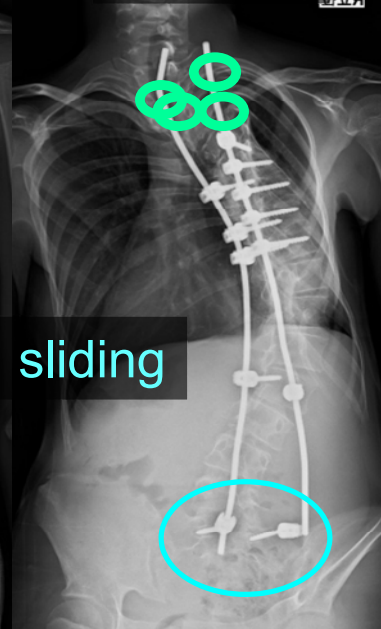
Post-initial



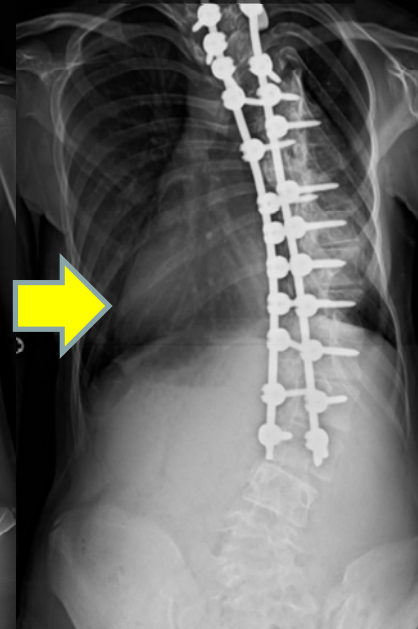
Pre-final



Post-final



sliding



None of the 4 cases showed autofusion in fusionless area.

Review

Our study	No of cases	Complication rate	No. of additional surg. / Pts
Shilla	22	82%	0.8 \pm 1 / 4year
Akbarnia,et al.; <i>Spine</i> 2008			
Growing rod	140	58%	Repetitive scheduled surgeries 8 / 4year
Watanabe,et al.; <i>Spine</i> 2013			
Growing rod	88	57%	
Emans,et al.; <i>Spine</i> 2005			
VEPTR	31	55%	

Potentially **negative psychological consequences** from repeated surgical interventions.

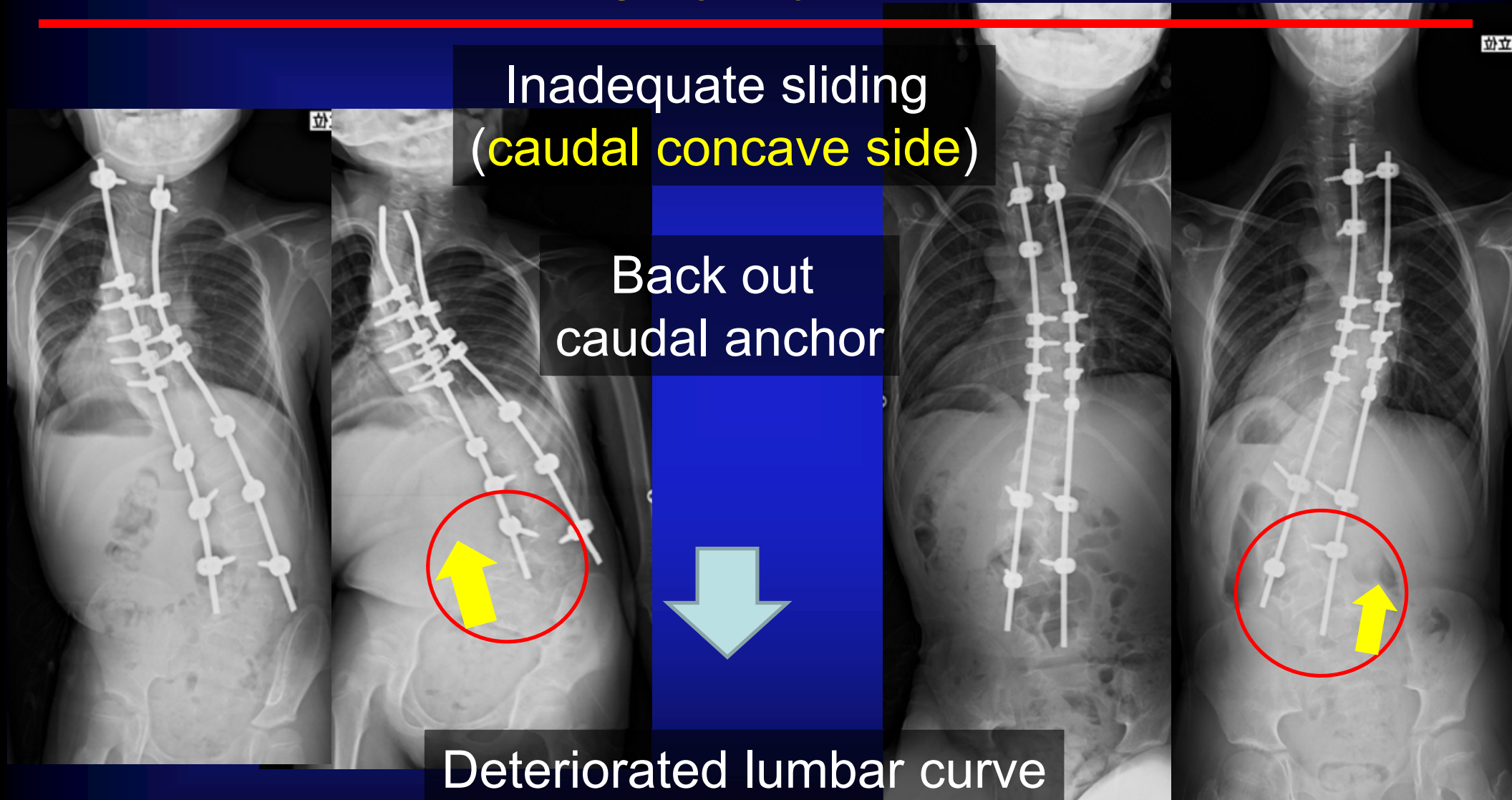
Akbarnia,et al.; *JBJS* 2010

Growth?

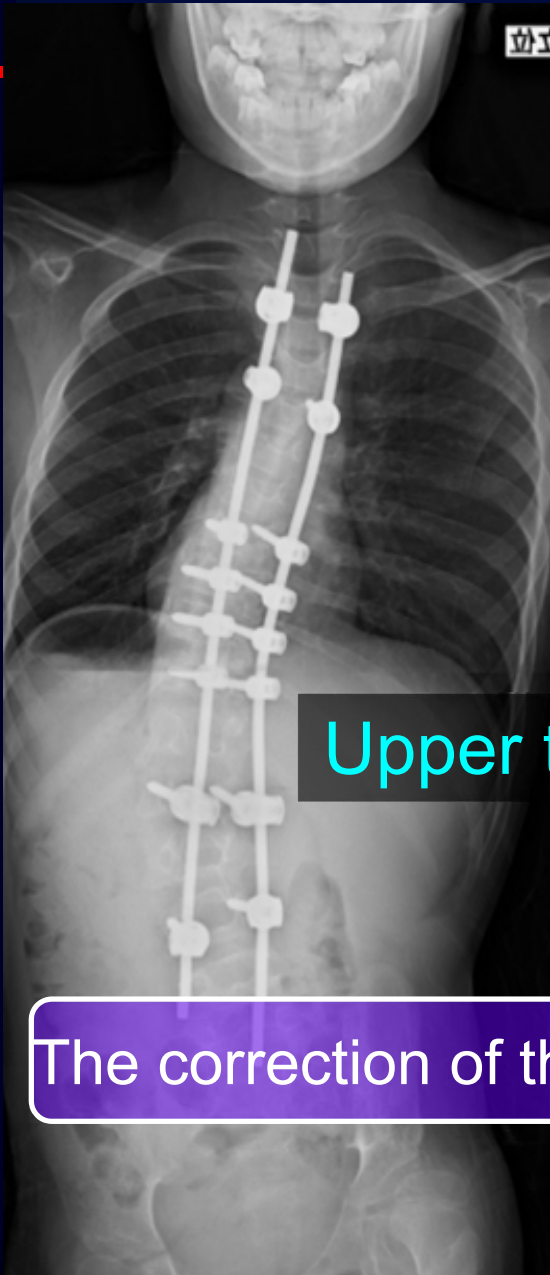
Inadequate sliding
(caudal concave side)

Back out
caudal anchor

Deteriorated lumbar curve
and coronal balance



Growth?

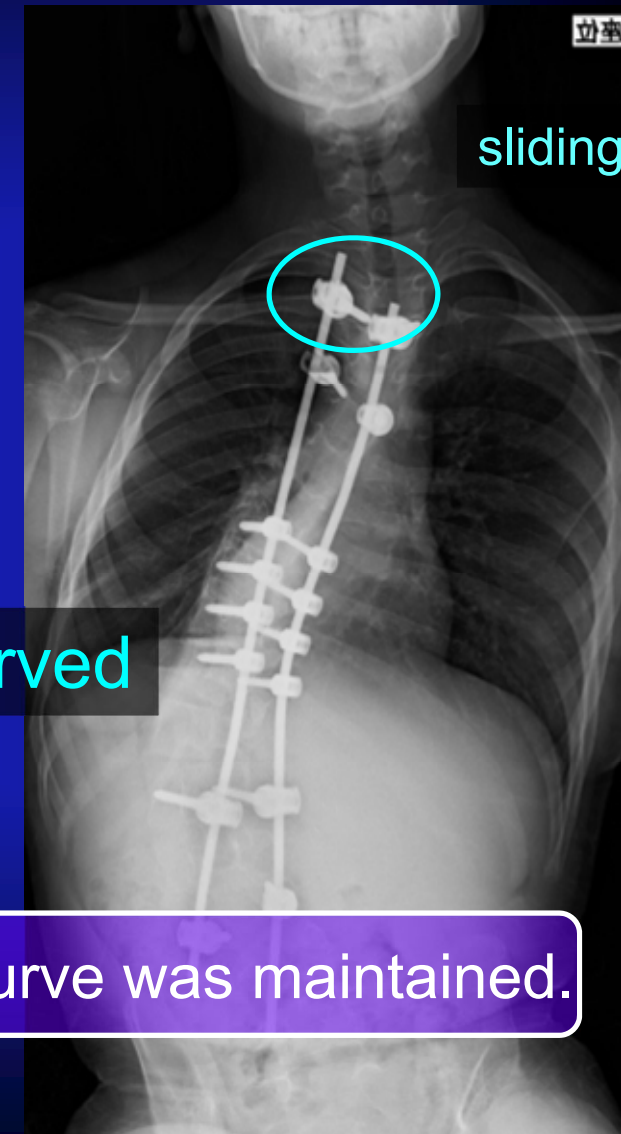


Correction loss

UT	10%
MT	20%
L	40%

Upper thoracic curve was preserved

Apical fusion



The correction of the upper thoracic and apex curve was maintained.

Conclusion

- Retrospective case review of 22 consecutive children who had the modified Shilla procedure at a single institution.
- The Shilla technique reduced the number of total surgeries.
- The inadequate sliding of the caudal anchor may cause temporary deterioration of lumbar curve
- The Shilla construct could maintain the correction of the curve at the apex.

