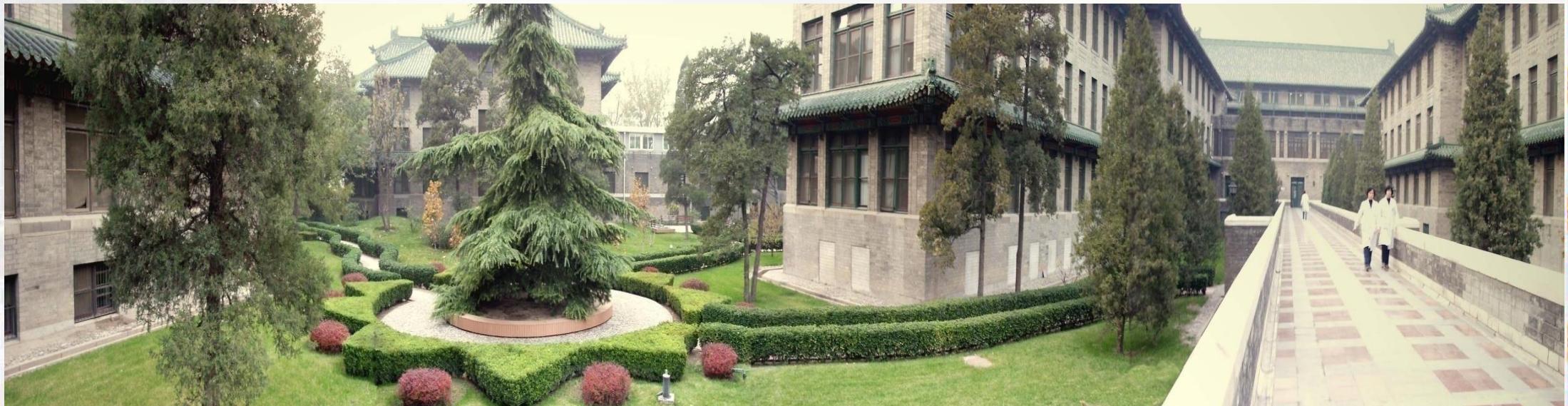


Avoid maximal correction in lower lumbar hemivertebra resection

-- Taking sacrum morphology into consideration



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Background

Sacral tilting

Lee *et al.* Spine J 2015

- AIS patients
- 5° (19.5%)
- 4° (29.6%)
- 3° (40.6%)

Lee *et al.* Spine J. 2015; 15(5):834-40.



Congenital scoliosis
No related report !



Purpose

Sacral slanting in congenital lumbar deformity due to Hemivertebra

✓ Frequency

✓ Etiology

✓ Surgical strategy



Methods

- From July 2004 to December 2014

- Inclusion criteria:
 - ❖ Age <10 years old
 - ❖ Hemivertebra located at lumbar spine
 - ❖ Follow-up >24 months



Measurement

➤ Sacrum slanted angle

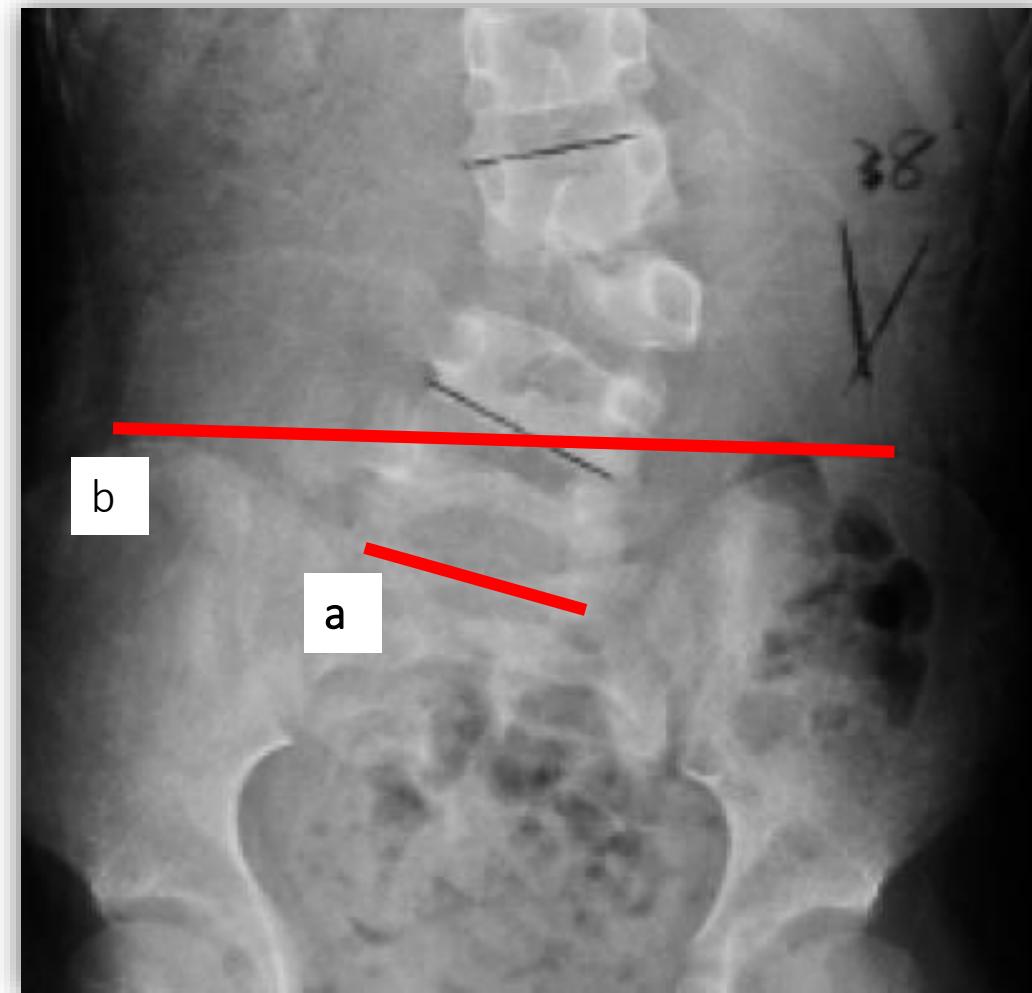
✧ a-b

➤ Sacral Slanting

✧ Sacral slanted angle $> 5^\circ$

➤ Obvious Sacral Slanting

✧ Sacral slanted angle $> 10^\circ$



Measurement

- **Post-operative UIV-Pelvis angle**

- ✧ b-c

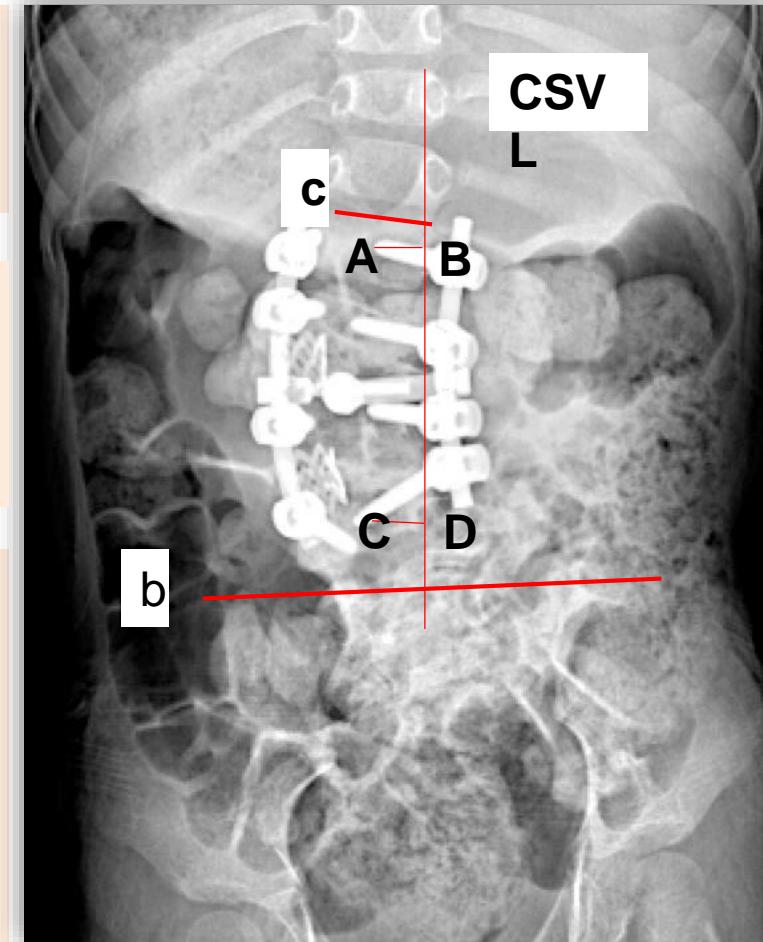
- **UIVT: distance between A and B**

- **LIVT: distance between C and D**

- **Proximal adding-on**

- ✧ Cranial compensatory curve $>10^\circ$

- ✧ Convex to the same side with hemivertebra



Results

Total patients	42/68
F/M	17/25
Mean age	4 yrs (2-9)
Average follow-up	51.7 months (24-132)
Average fused segments	2.64 (2-6)
Hemivertebrae resected	49



Results

Coronal

	Pre-op	Post-op	Follow-up	p value
Cobb of L curve (°)	38.0±11.7	6.1±8.1	10.4±11.40	<0.001*
Correction rate (%)		85.0±15.0	74.6±22.0	
Segmental Cobb (°)	34.8±9.6	4.7±6	8.7±8.5	<0.001*
Cranial compensatory curve (°)	15.6±9.4	4.3±6.2	6.8±6.1	<0.001*
Sacral slanting(°)	7.2±5.7	5.1±4.1	4.5±4.7	<0.001*
Post UIV-Pelvis Angle (°)		3.9±3.5		
LIVT (°)	12.1±9.3	4.3±4.1	5.4±6.5	<0.001*
UIVT (°)	16.3±10.6	7.6±6.9	7.9±8.4	<0.001*
TS (mm)	15.4±13.9	16.8±12.6	12.1±10.3	0.052



Results

Sagittal

	Pre-op	Post-op	Follow-up	p value
L lordosis (°)	34.43 ± 17.0	35.6 ± 10.9	42.0 ± 13.4	0.018*
Segmental kyphosis (°)	-9.0 ± 12.5	7.5 ± 7.6	8.7 ± 11.3	<0.001*
TL junction (°)	5.4 ± 11	5.0 ± 6	5.7 ± 9.1	0.825
T kyphosis (°)	14.8 ± 8.8	16.8 ± 6.1	28.3 ± 21.9	0.12
SVA (mm)	28.3 ± 21.8	36.0 ± 22.6	31.7 ± 21.0	0.17



Results

Multiple linear regression analysis between potential factors and post-op or follow-up TS

	Variables	Regression coefficients	Standardized regression coefficients	t value	p value
Post-op TS	Constant	9.338		2.987	0.005
	Post-op UIVT	0.876	0.459	2.921	0.006*
FU TS	Variables	Regression coefficients	Standardized regression coefficients	t value	P value
	Constant	15.977		9.957	<0.001
	LIVT change	-0.532	-0.526	-3.816	<0.001*



Results

Multivariate analysis of potential risk factor for proximal adding-on

Variables	OR	95% for OR		<i>p</i> value
		lower	upper	
Constant	3626.5			0.004
Post-op Sacral slanted angle	0.599	0.407	0.883	0.01*
UIV-pelvis angle	0.525	0.307	0.899	0.019*



Complications

	No.	%
Wound nonunion	1	2.38
Pedicle screw displacement	3	7.14
Proximal adding-on	13	30.95

No major neurologic complications!



Discussion

Etiology

Congenital
malformation



Discussion

Surgical strategy for HV resection + short fusion

❖ Smaller post-op UIVT

❖ Leveled upper endplate of UIV



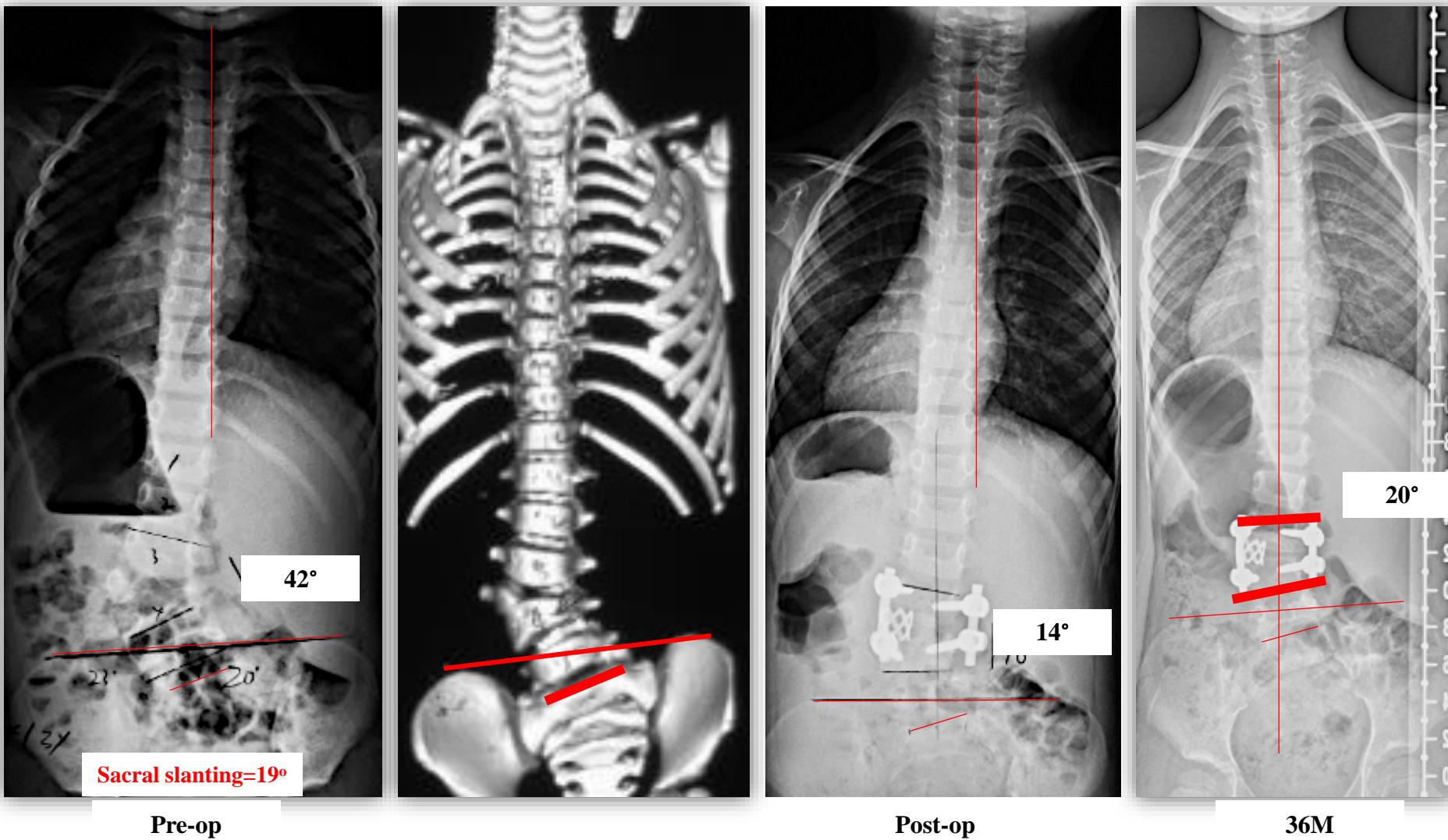
Good coronal balance

➤ Residual curve = Sacral Slanting

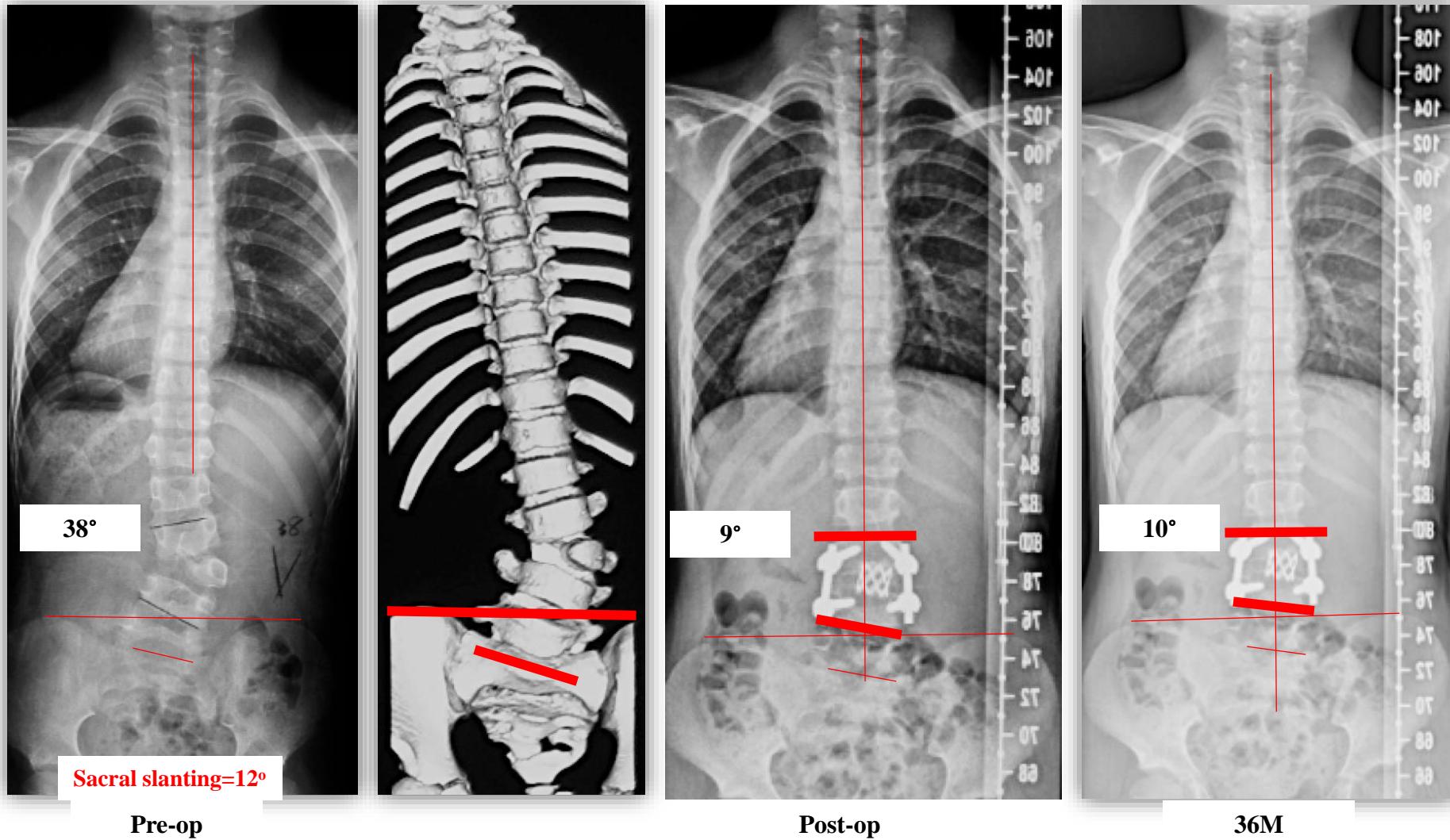
➤ Asymmetrical titanium mesh cage



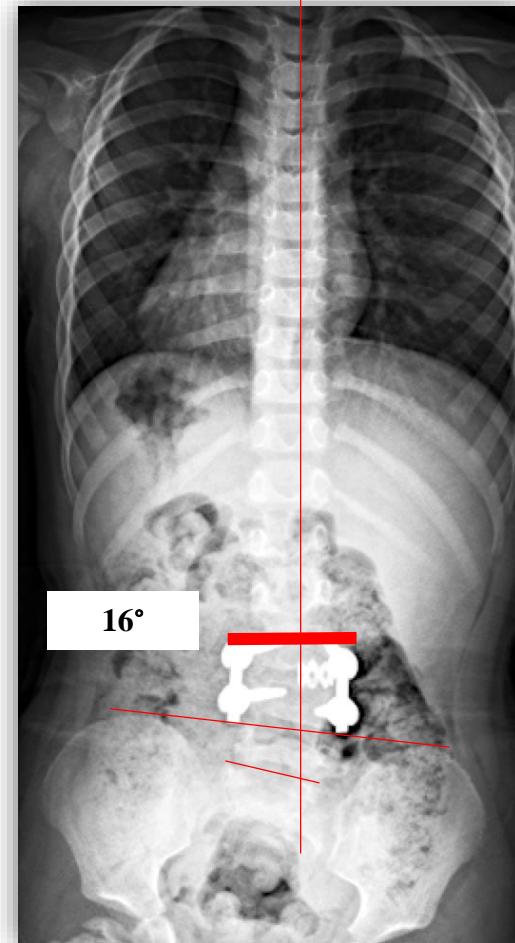
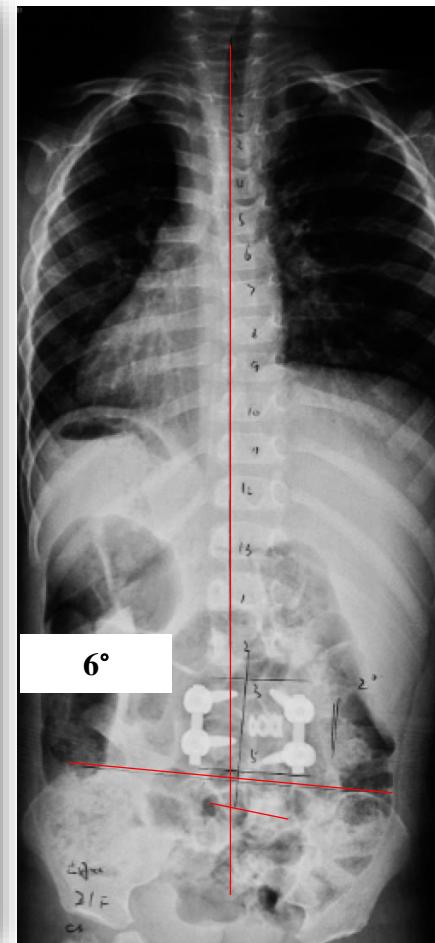
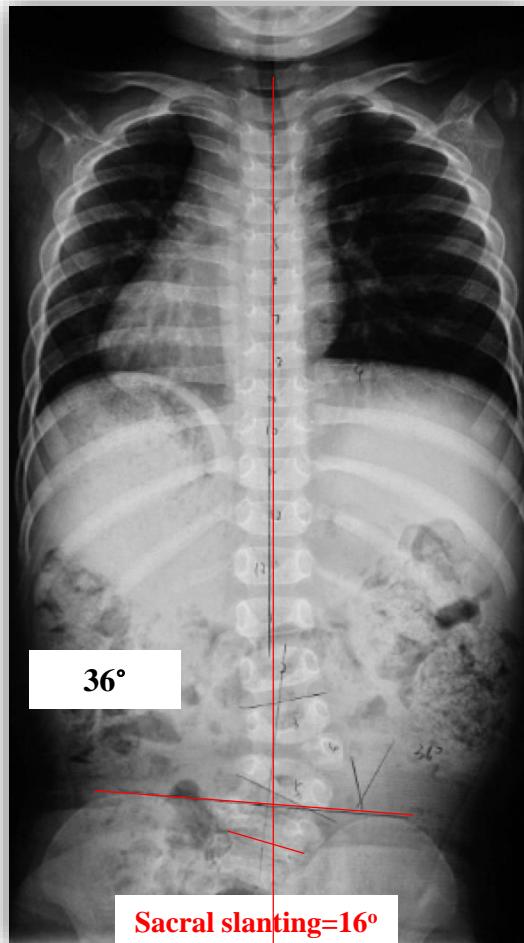
F/3y L3/4 HV



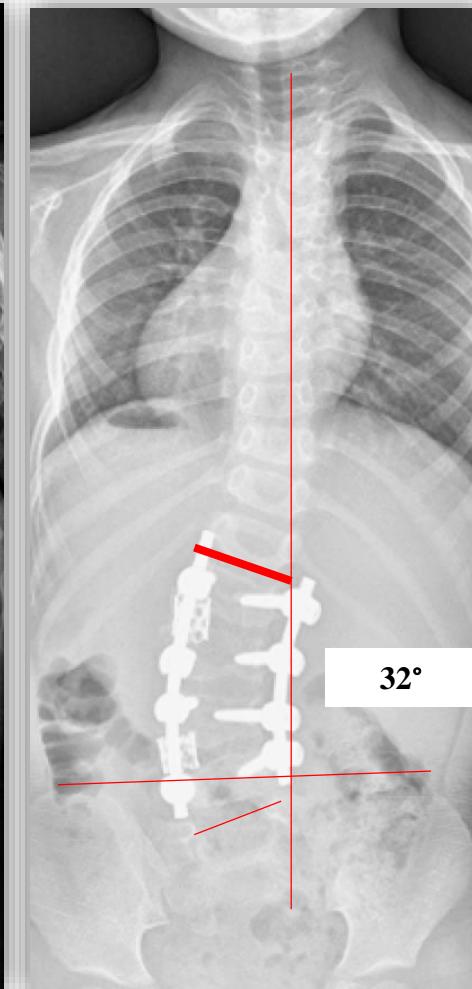
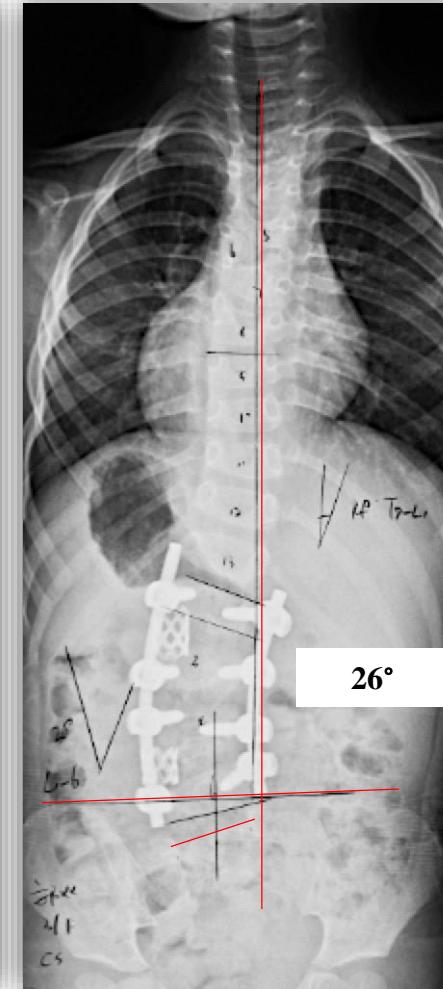
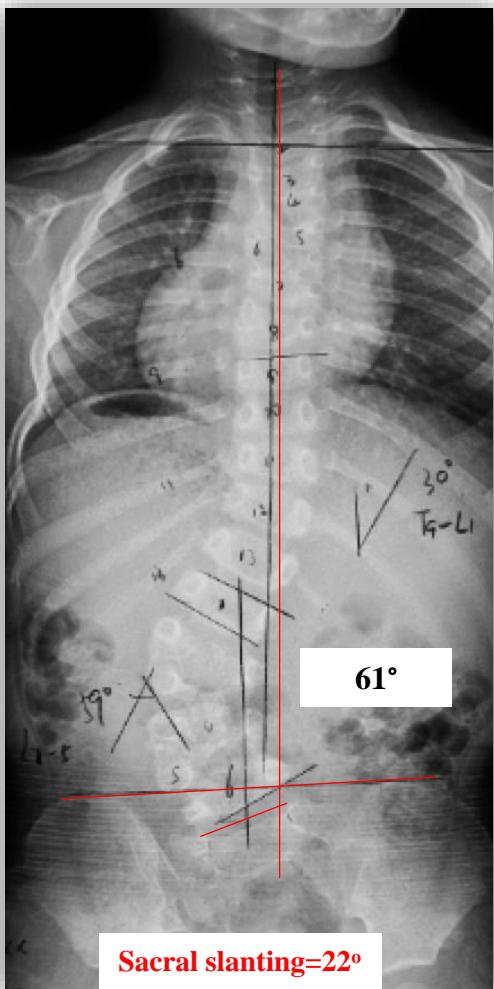
F/7y L3 HV



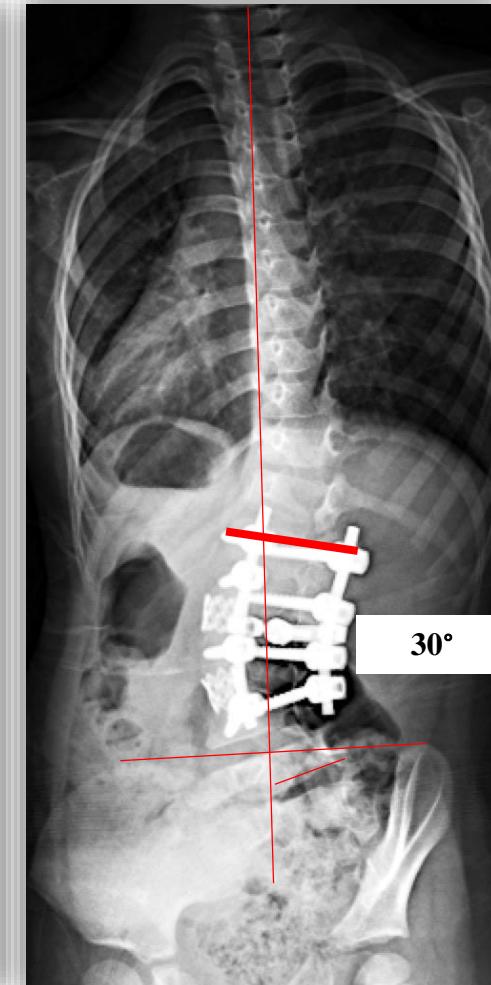
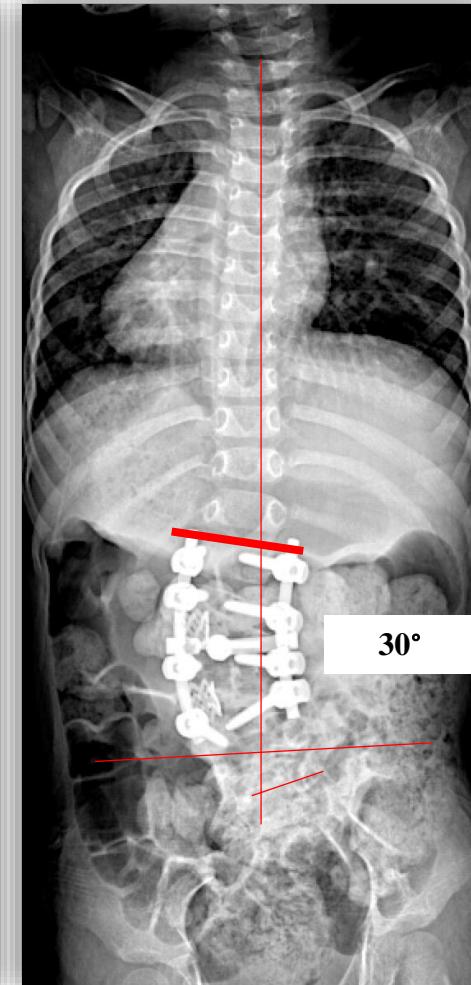
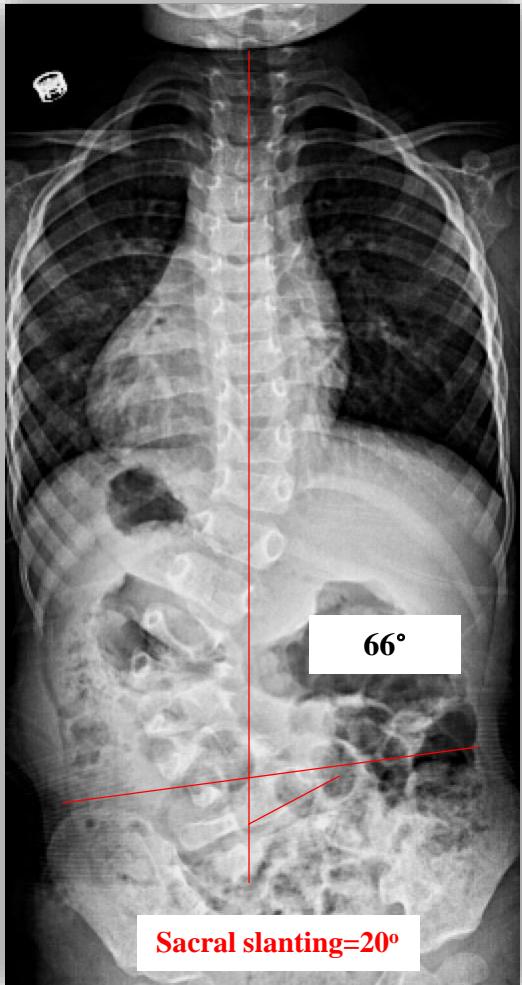
F/2y L3/4 HV



F/3y L2 & L4/5 HV



F/3y L2/3 & L3/4 HV



Summary

Sacral slanting in lumbar hemivertebra deformity younger than 10 year old

- ✓ Frequency : 61.9%
- ✓ Etiology : congenital malformation
- ✓ Surgical strategy : under-correction





Thanks!

