Hemivertebra Resection and Transpedicular Short Fusion in Children Younger than 5 Years. A Mid-Term Follow-Up Analysis

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Disclosures

- JM Sánchez Márquez: None
- M Pérez: Contractual Service Support DePuy-Synthes Spine
- J Pizones: Consultant DePuy-Synthes Spine
- N Fernández-Baíllo: Consultant DePuy-Synthes Spine and Medcomtech
- FJ Pérez-Grueso: Consultant K2M

Introduction

Despite the successful published results regarding this surgical technique

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One-Stage Posterior Hemivertebra Resection and Correction Using Segmental Posterior Instrumentation

Yasuhiro Shono, MD, PhD, Kuniyoshi Abumi, MD, PhD, and Kiyoshi Kaneda, MD, PhD

SPINE Volume 27, Number 10, pp 1116–1123
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Hemivertebra Resection by a Posterior Approach

Innovative Operative Technique and First Results

Michael Ruf, MD, and Jürgen Harms, MD

SPINE Volume 28, Number 18, pp 2132–2138
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Posterior Hemivertebra Resection With Transpedicular Instrumentation: Early Correction in Children Aged 1 to 6 Years

Michael Ruf, MD and Jürgen Harms, MD

SPINE Volume 34, Number 6, pp E225–E229
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Three Rod Technique Facilitates Hemivertebra Wedge Excision in Young Children Through a Posterior Only Approach

Daniel Hedequist, MD, John Emans, MD, and Mark Proctor, MD

Spine
DEFORMITY

SPINE Volume 40, Number 8, pp E484-E491
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Posterior Hemivertebra Resection and Short Segment Fusion With Pedicle Screw Fixation for Congenital Scoliosis in Children Younger Than 10 Years

Greater Than 7-Year Follow-up

Dong-Gune Chang, MD,* Jin-Hyok Kim, MD,* Kee-Yong Ha, MD,† Jung-Sub Lee, MD,‡ Ji-Seok Jang, MD,* and Se-Il Suk, MD*

literature lacks of **mid-term** results especially on **very young** children

Objective

- To report the **mid-term results** of early hemivertebra (HV) resection and short fusion in a cohort of **young patients** with congenital scoliosis

- Analyze the different results between **TL and LS** HV

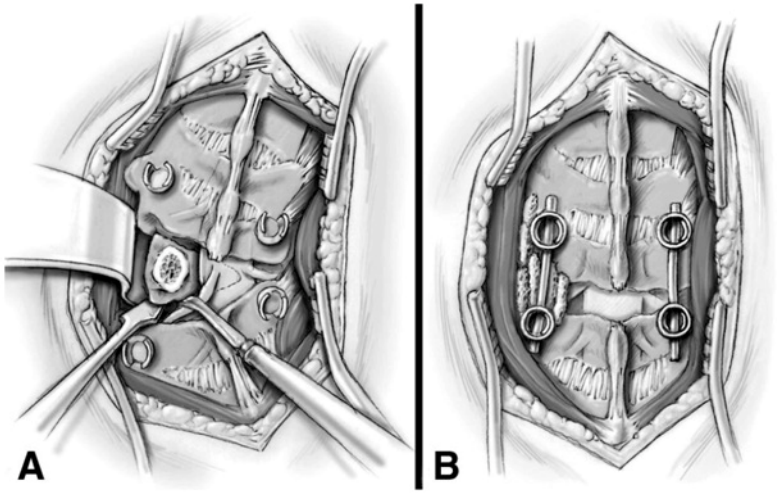
Methodology

Retrospective case series analysis

- **Inclusion criteria**:
  - Patients < 5 yrs
  - HV resection

    +

    transpedicular short fusion



  - Follow-up longer than 5 years

Methodology

- Demographic data
- Preoperative, postoperative (1-yr) and final updated radiographic parameters:
  - Main Cobb
  - Compensatory Cobb
  - Segmental kyphosis
  - Coronal balance
- Complications were recorded

Methodology

- Comparisons of measures over the course of time

in the global sample was done with **dependent t-test**

- Comparison between TL / LS curves was done

with **Mann-Whitney U**

Results

- 23 patients met inclusion criteria
    - 14 had thoracolumbar (TL) HV
    - 9 were lumbosacral (LS)
- Mean age at surgery was 3.5 ± 1.7 years
- Mean follow-up was 7.6 years (5 -13.7)

Results

Summary of the main radiographic parameters

	Preoperative	Postoperative	Final f-up	P	Pre to Post Correction	Pre to Final
Main Cobb (º)	40.3º±6.7	14º±6.4 -6º	19.9º±10.7	0.001* 0.005*	65%	50%
Cranial Cobb (º)	25.3º±14.8	13.5º±12 -6º	19.9º±10.7	0.000* 0.011*	46%	21%

Results

Summary of the main radiographic parameters

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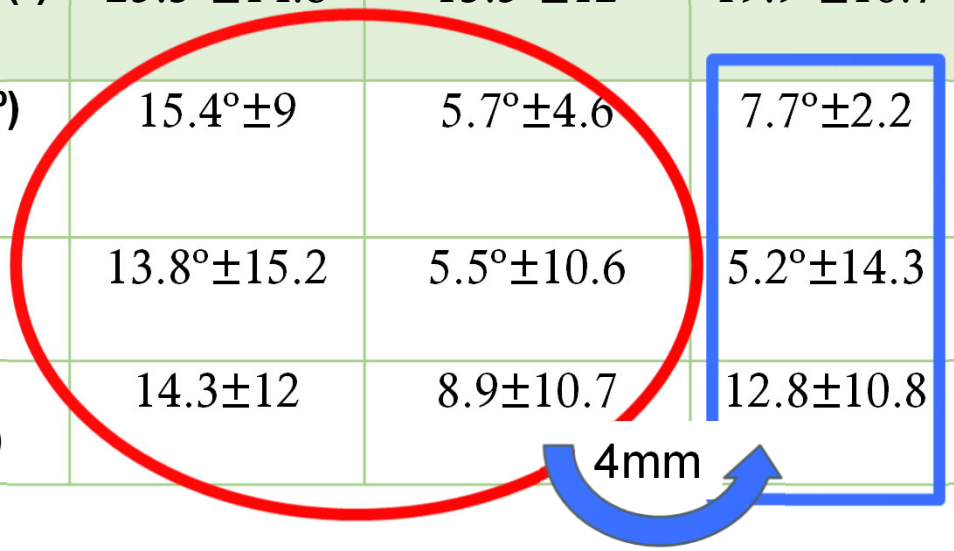
Main Cobb (º)	40.3º±6.7	14º±6.4	19.9º±10.7	0.001* 0.005*	65%	50%
Cranial Cobb (º)	25.3º±14.8	13.5º±12	19.9º±10.7	0.000* 0.011*	46%	21%
Distal Cobb (º)	15.4º±9	5.7º±4.6	7.7º±2.2	0.030* **0.563**	63%	50%
Kyphosis (º)	13.8º±15.2	5.5º±10.6	5.2º±14.3	0.000* **0.678**	60%	62%
Coronal balance (mm)	14.3±12	8.9±10.7	12.8±10.8	0.154 **0.059**	37%	10%



Main Cobb Correction was significantly better for the TL group

	TL (14)	LS (9)	P
Age (months)	43.3±19.4	42.6±23	0.829
Preop Main Cobb (º)	43.6±4.8	35.2±6.4	0.003*
Postop Main Cobb (º)	13.8±7	14.3±5.7	0.948
Postop Difference	**-29º±7.9, 68%**	**-20º±9.2, 59%**	**0.043 ***
Final Main Cobb (º)	19±13.4	21.3±4.7	0.336

Main Cobb Correction was significantly better for the TL group

Both groups lost correction at final follow-up

	TL (14)	LS (9)	P
Age (months)	43.3±19.4	42.6±23	0.829
Preop Main Cobb (º)	43.6±4.8	35.2±6.4	0.003*
Postop Main Cobb (º)	13.8±7	14.3±5.7	0.948
Postop Difference	-29º±7.9, 68%	-20º±9.2, 59%	0.043 *
Final Main Cobb (º)	19±13.4	21.3±4.7	0.336
Final loss	**4.3º±4.6, 56%**	**7º±7.7, 39%**	**0.186**

The LS-group had a bigger preoperative compensatory curve

	TL (14)	LS (9)	P
Preop Proximal Cobb (º)	**19.2±12.2**	**35.9±13.3**	**0.006***
Postop Proximal Cobb (º)	8.9±8	22.1±14.1	0.030*
Postop Difference	-10.6º±9.4	-15.2º±10.1	0.31
Final Proximal Cobb (º)	10.4±10.1	31.9±20	0.016*

The LS-group had a bigger preoperative compensatory curve

Compensatory curve correction was similar between groups

	TL (14)	LS (9)	P
Preop Proximal Cobb (º)	19.2±12.2	35.9±13.3	0.006*
Postop Proximal Cobb (º)	8.9±8	22.1±14.1	0.030*
Postop Difference	**-10.6º±9.4**	**-15.2º±10.1**	**0.31**
Final Proximal Cobb (º)	10.4±10.1	31.9±20	0.016*

The LS group lost more compensatory curve correction at final follow-up

	TL (14)	LS (9)	P
Preop Proximal Cobb (º)	19.2±12.2	35.9±13.3	0.006*
Postop Proximal Cobb (º)	8.9±8	22.1±14.1	0.030*
Postop Difference	-10.6º±9.4	-15.2º±10.1	0.31
Final Proximal Cobb (º)	10.4±10.1	31.9±20	0.016*
Final loss	**-0.5º±5.5**	**-9.7º±10.9**	**0.046***

Kyphosis correction was better for the TL group

	TL (14)	LS (9)	P
Preop Kyphosis (º)	17.6±16.4	5.5±8.6	0.087
Postop kyphosis (º)	6.6±12.1	2.5±5	0.412
Postop Difference	**-14.2º±8.6**	**-2º±4**	**0.018***
Final kyphosis (º)	4.5±16.2	7±9.7	0.959

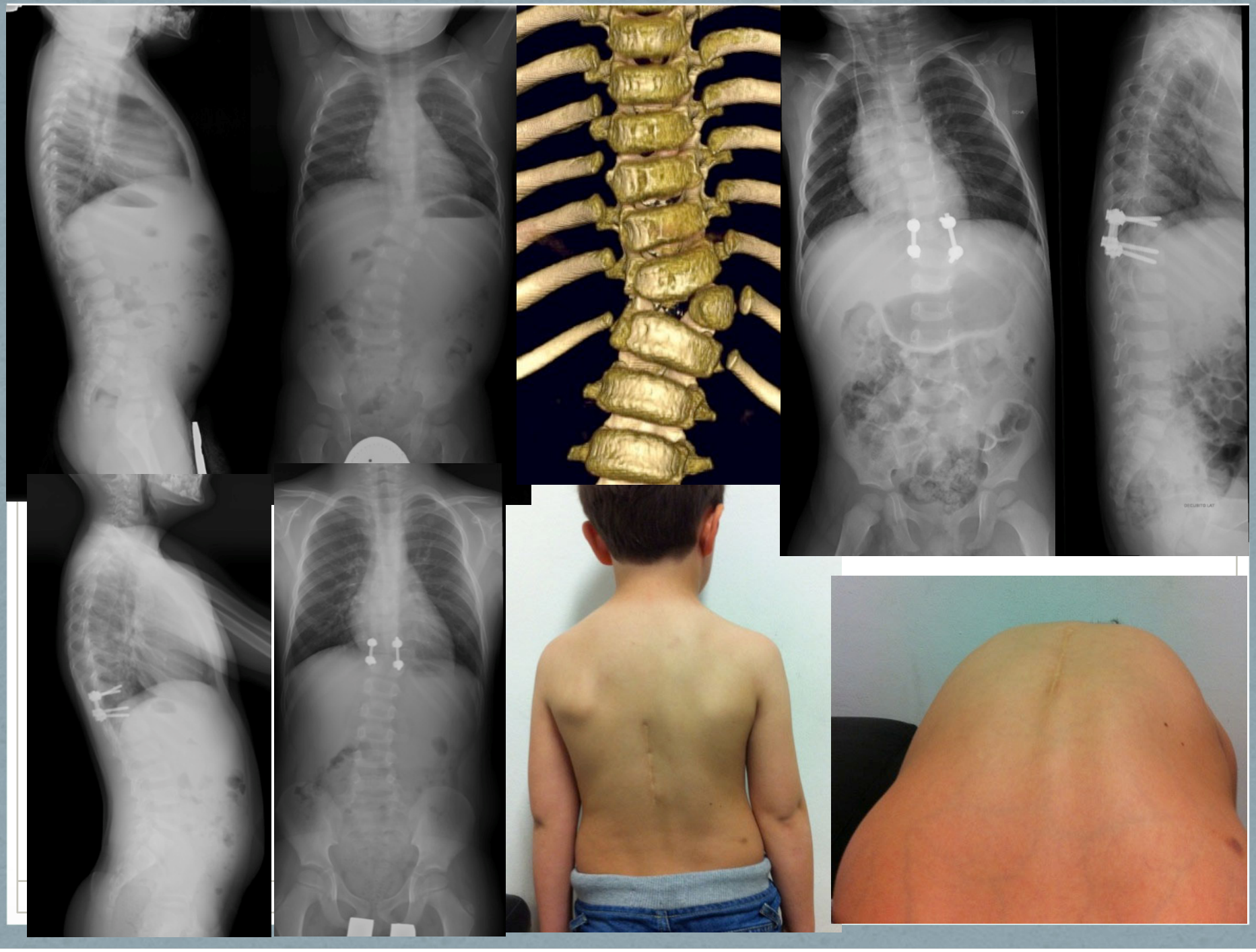
Kyphosis correction was better for the TL group

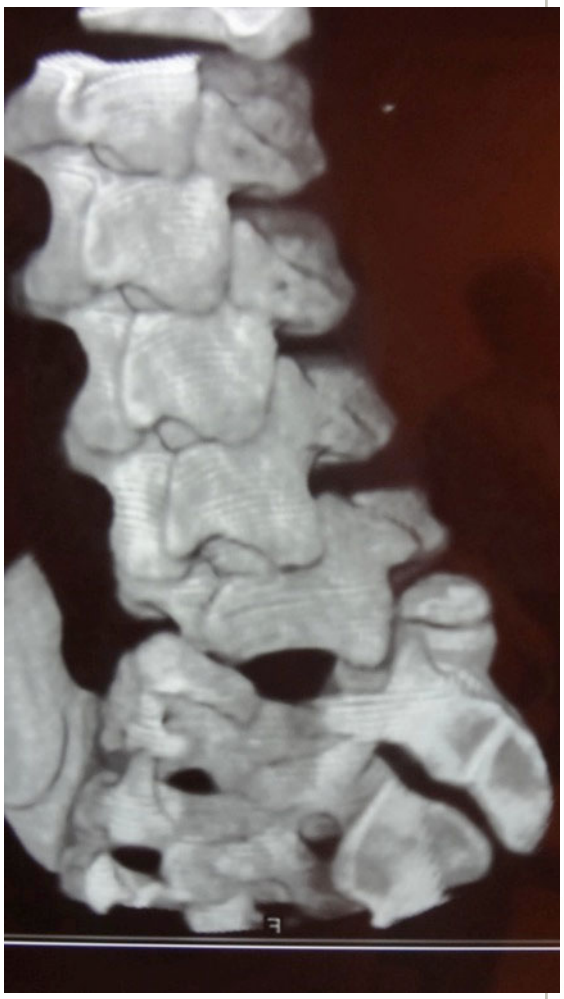
And was maintained at final follow-up

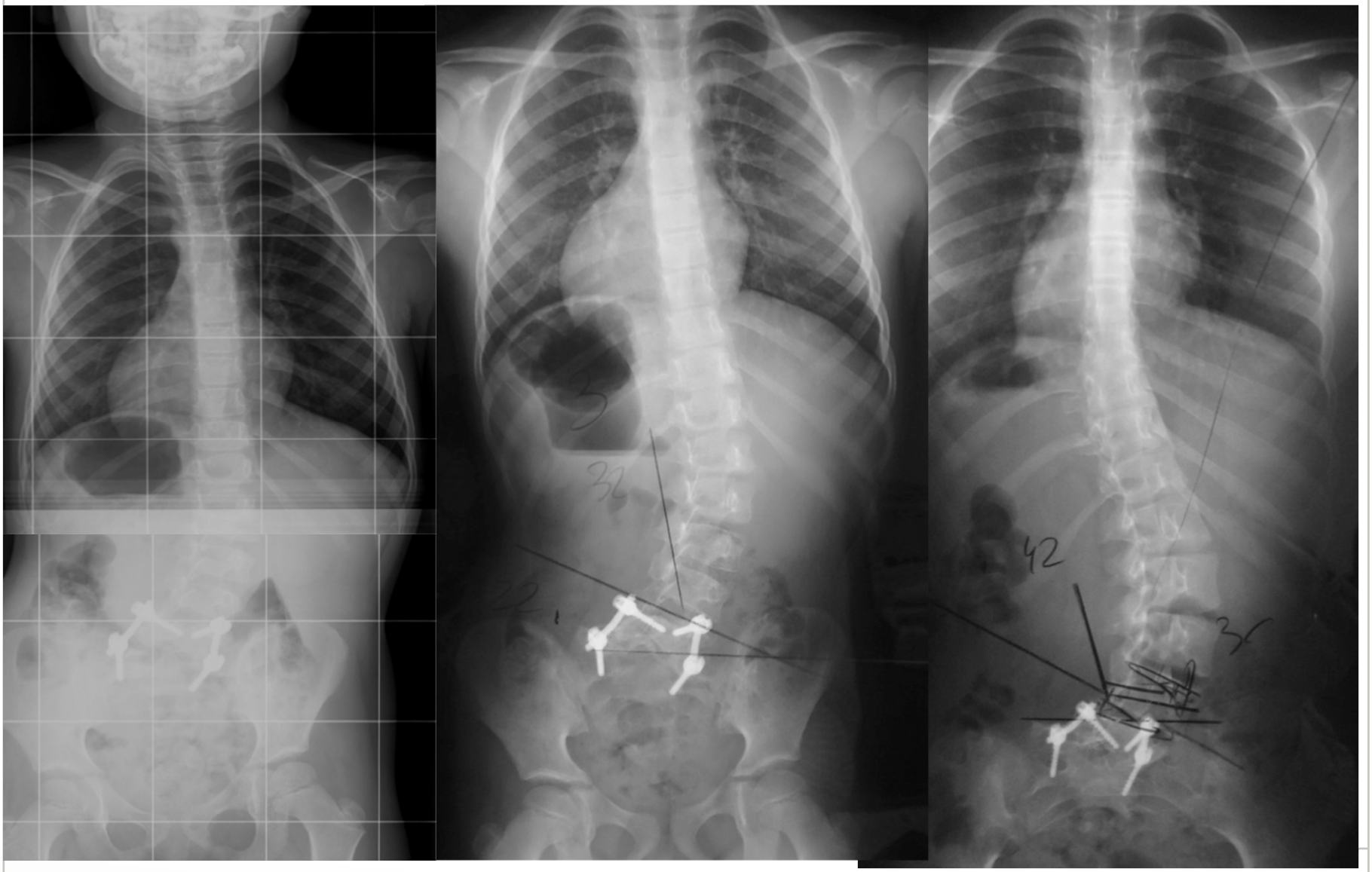
	TL (14)	LS (9)	P
Preop Kyphosis (º)	17.6±16.4	5.5±8.6	0.087
Postop kyphosis (º)	6.6±12.1	2.5±5	0.412
Postop Difference	-14.2º±8.6	-2º±4	0.018*
Final kyphosis (º)	4.5±16.2	7±9.7	0.959
Final loss	**-2º±12**	**-1.2º±2.5**	**0.226**

The LS group was significantly more unbalanced at final follow-up

	TL (14)	LS (9)	P
Preop Coronal balance (mm)	11.5±11.2	18.9±12.8	0.238
Postop Coronal balance (mm)	5.5±7.8	13.8±12.7	0.152
Postop Difference	-4.5±13.1	-5.2±16	1
Final Coronal balance (mm)	**7.4±7.2**	**20.7±10.6**	**0.004***
Final loss	1.4±6.8	-8.2±11.2	1.52



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Complications

- Four patients required revision surgery due to curve progression or instrumentation failure (pseudoathrosis – screw loosening).

- All the patients with LS HV needed a brace to control the compensatory curve

Conclusions

- Early HV resection and transpedicular short fusion **allowed good correction initially**, preventing the development of severe deformities and secondary structural curves

- Main Cobb and Sagittal plane correction was **excellent in TL** deformities. However, **Main Cobb correction was difficult to maintain at mid-term follow-up**

Conclusions

- Results were **more challenging in the lumbosacral group** compared with the thoracolumbar group

- With final loss of correction in both coronal curves and coronal balance