Anterior surgery for Congenital Scoliosis Secondary to Lateral Hemivertebra

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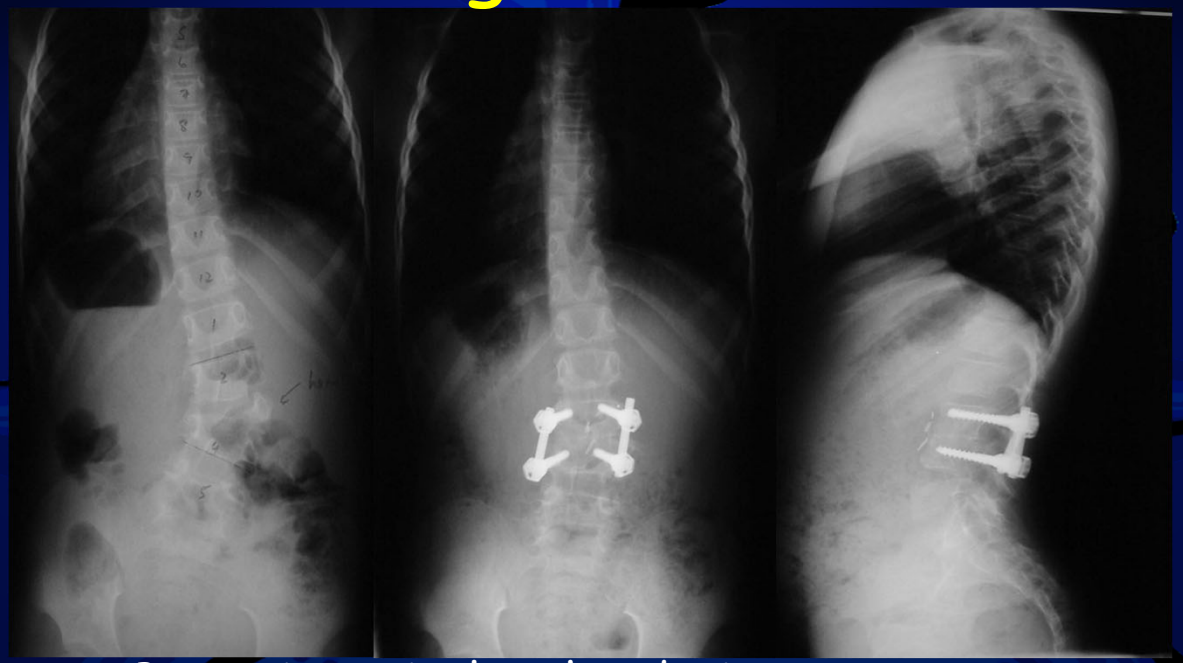
"Surgical menu"



Posterior spinal arthrodesis
Convex growth arrest
Convex fusion and concave distraction
Combined anterior and posterior hemiepiphysiodesis
Excision of hemivertebrae and wedge resection
Anterior instrumented fusion + posterior arthrodesis
Posterior HV resection with transpedicular instrumentation

Short segment anterior instrumented fusion of hemivertebra for congenital scoliosis in very young children

1996 to 2005

31 lateral hemivertebrae, 29 patients, M:F 1:1

Mean age at surgery was 2.9 years (8 months – 5.9yrs)

Mean follow-up period 6.3 years (24.1m – 11.3 yrs)

Thoracolumbar junction (T10-L2)	18
Lumbar spine (L3-L4)	10
Thoracic spine	3

Patient population

- Single fully segmented HV 25
- Semisegmented midlumbar HV 2
- Two ipsilateral fully segmented hemivertebra 2
- Total 31

Spinal cord anomalies 4 (14%)
Other congenital vertebral anomalies 8 (28%)
Congenital heart disease 6 (21%)
Genitourinary anomalies 4 (14%)
Gastrointestinal anomalies 3 (10%)
One Goldenhar syndrome

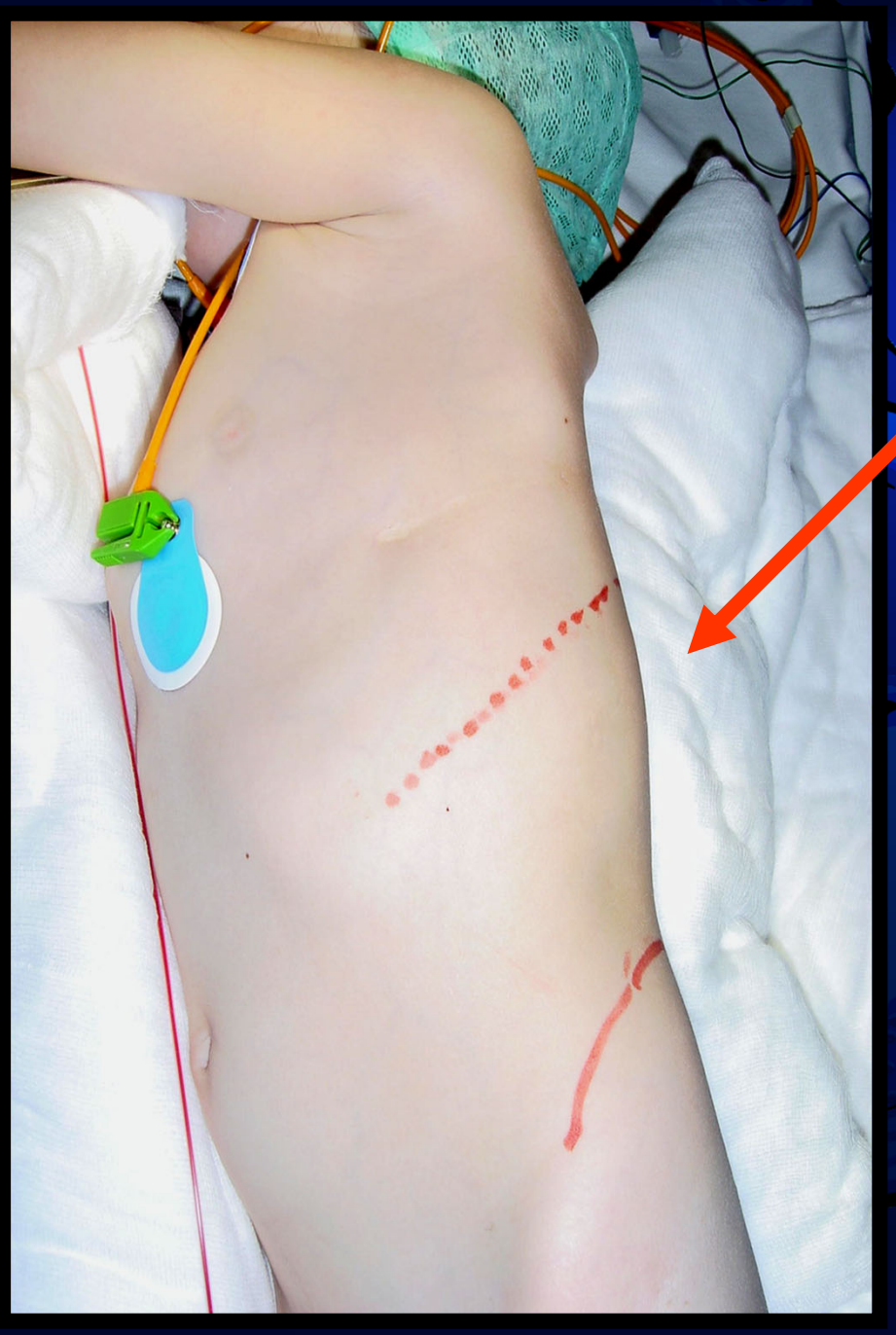
Surgical technique
How short?

- The vertebra above and below the HV were instrumented in 26 cases
- in 5 cases an additional level had to be instrumented

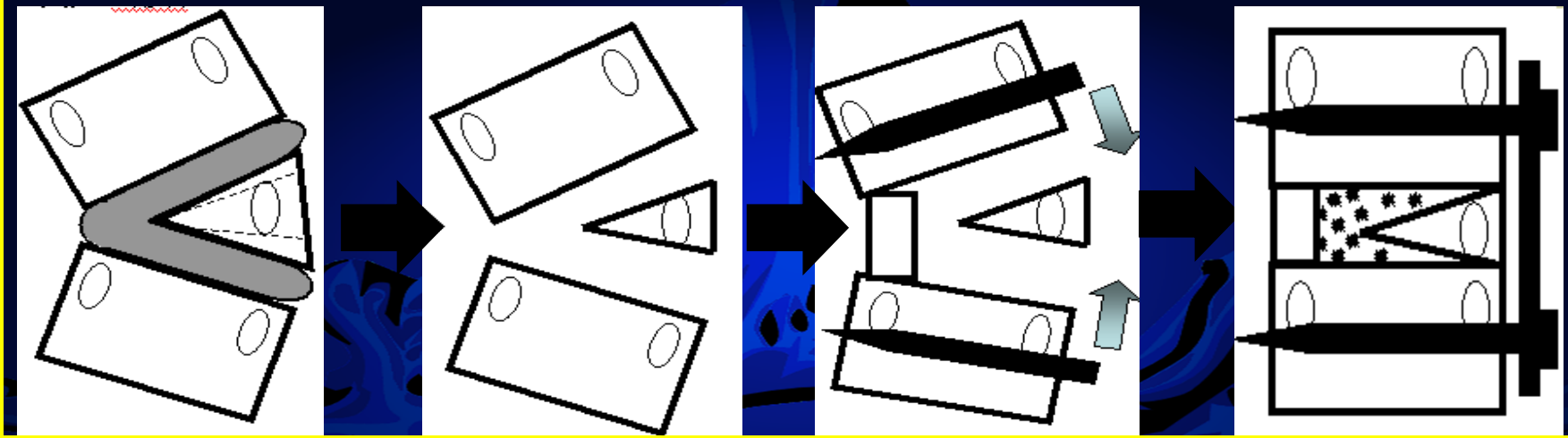
3 Thoracic HV due to higher rigidity
1 Due to vertebral body fracture during screw insertion
1 For higher magnitude curve

Surgical technique

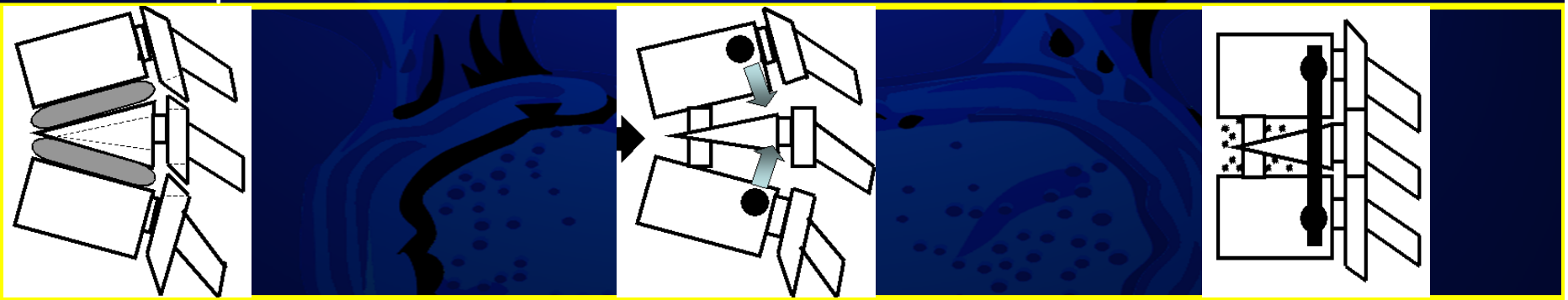
- Short segment anterior instrumented fusion using a single solid rod construct
- Simultaneous posterior convex non-instrumented fusion corresponding to the levels of the anterior surgery



AP correction



Lateral Sequence



1. Discectomy caudal and cephalad to HV
2. Excision end-plates (Partial Corpectomy) & facectomy
3. Anterior directed pressure over spine to open disc space
4. Rib strut graft inserted into concave disc
5. Bicortical transbody screw insertion
6. Rod insertion and compression using strut as a fulcrum
7. Locking of nuts with anti-torque
8. Placement of additional graft

Results

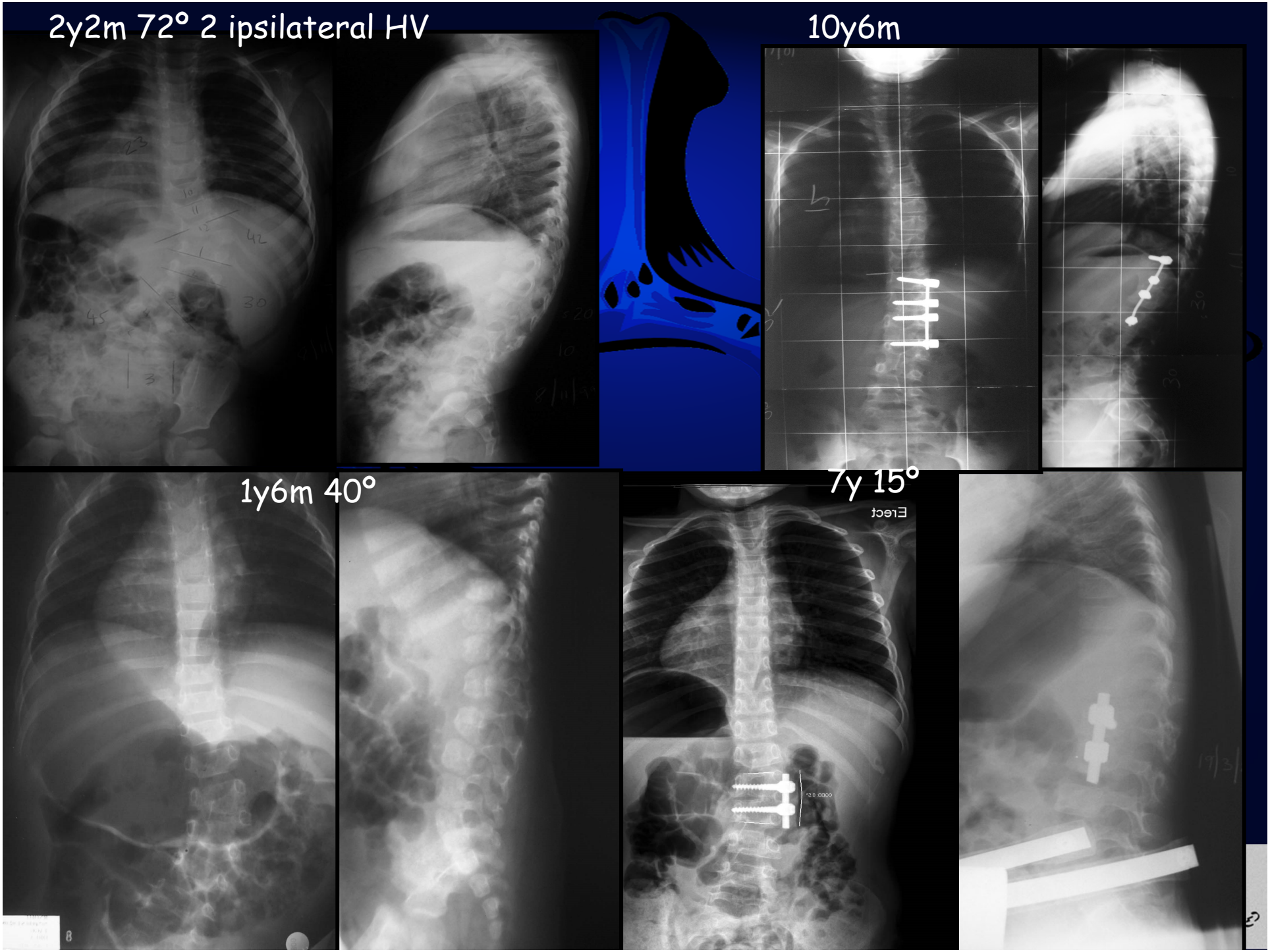
	Preoperative	Follow-up
Total main curve (°)	41.3 (range 29-60)	17 (range 6-36) 57%
Segmental curve (°)	39.4 (range 29-55)	15 (range 3-32) 60%
Cranial curve (°)	15 (range 5-30)	8 (range0-20) 46%
Caudal curve (°)	20 (range4-45)	10 (range 0-32) 50%
Segmental kyphosis (°)	13 (range 3-30)	12 (range 2-25)
Total kyphosis T3-T12 (°)	15 (range 0-35)	25 (range 4-43)
Lumbosacral Lordosis (°)	36 (range10-65)	41 (range 15-58)
Operating time	133 min (range 80-210min)	
Blood loss (% EBV)	176 ml (10%) (range 5-24%)	

Complications

- 2 posterior wound infections requiring surgical debridement
- 1 intra-operative fracture of vertebral body
- 1 case loss of correction due to implant failure

All cases proceeded to stable bony union

No neurological complications


2y2m 72° 2 ipsilateral HV
10y6m
1y6m 40°
7y 15°

Observations

- Accepted normal ranges of thoracic kyphosis and lumbar lordosis in children are 20°-50°, and 20°-60° respectively.
- In our present study, 7 patients were outside this range: 5 patients with thoracolumbar HV and 1 patient with a lumbar hemivertebra developed a thoracic hypokyphosis on follow up, and one patient with a lumbar HV developed lumbar hypolordosis and thoracic hypokyphosis

The average segmental kyphosis for these patients was 17°.

Why do I like it?
Anterior vs. posterior

Anterior instrumentation allows good coronal correction even in children young as 8 months

HV is partially preserved

Residual HV body ideal vascular graft

Not kyphogenic

Dural manipulation

Blood loss

Nerve root compression

Technically demanding above cauda equina

Pedicle fracture

Conclusions

- Early diagnosis and early aggressive surgical treatment are mandatory for a successful treatment of congenital scoliosis
- Anterior instrumentation is a safe and effective technique capable of transmitting a high amount of convex compression
- Facilitates balanced growth in the coronal and sagittal planes
- Would the audience stay unisegemntal in kyphosis > 25 degrees?

Thank you