Three-column osteotomy in cervicothoracic congenital deformity

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Cervicothoracic deformity

Definition

Spine deformity with apex at C7-T1

Manifestation

cosmetic problem

Torticollis

Head tilting

Prominence of scapula

Etiology

Congenital

Neurofibromatosis type-I

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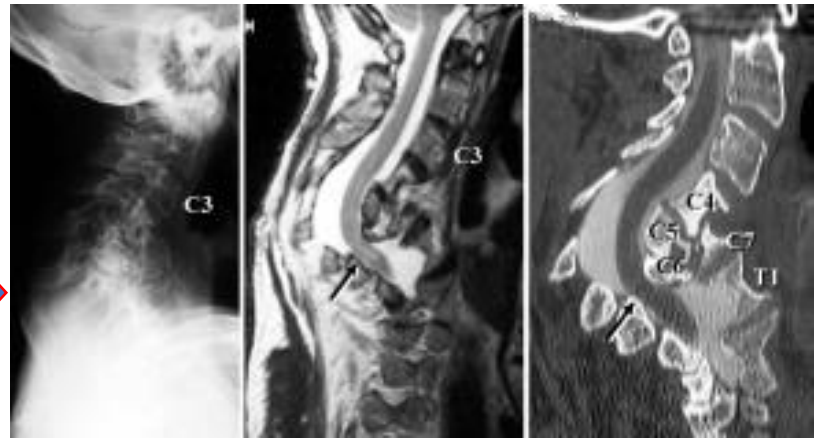

Cervicothoracic deformity

Simulated Surgery for a Patient With Neurofibromatosis Type-1 Who Had Severe Cervicothoracic Kyphoscoliosis and an Anomalous Vertebral Artery

Masashi Yamazaki, MD, PhD, Akihiko Okawa, MD, PhD, Takayuki Fujiyoshi, MD, PhD,

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Circumferential convex growth arrest by posterior approach for double cervicothoracic curves in congenital scoliosis

Ibrahim Obeid · Ayman Taieb · Jean-Marc Vital

Posterior-only Hemivertebra Resection for Congenital Cervicothoracic Scoliosis

Correcting Neck Tilt and Balancing the Shoulders

Zhonghui Chen, MD,* Yong Qiu, MD,* Zezhang Zhu, MD,* Song Li, MD,* Xi Chen, MD,† Liang Xu, MD,* and Xu Sun, MD*

16 of 18 total patients receive HV resection below T1!

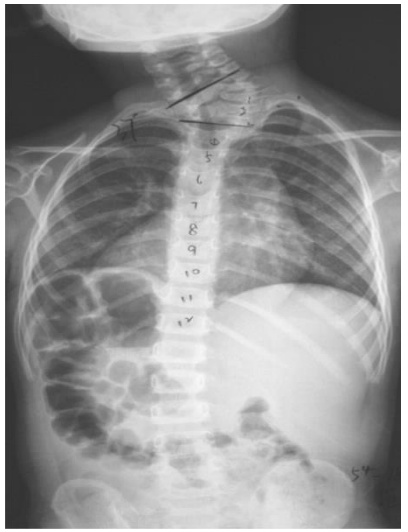
Retrospective study(PUMCH)

30 cases	**F/14 M/16**
Age at surgery	**11 (5-16) yrs**
Type of the deformities	
Failure of formation	***19***
Failure of segmentation	***4***
Mixed type	***7***
Intraspinal anomalies	**7(23.3%)**
Syringomyelia	***4***
Diastomyelia	***1***
Tethered cord	***2***
Meningocele	***2***
Neurologic deficits	***3***

Radiological finding

Curve Pattern

Single CT curve 10



Double curve 20

CT curve + upper thoracic curve

Surgical Procedure

Cervicothoracic deformities	
HV resection	*21*
PVCR	*8*
PSO	*1*
Level of osteotomy	
Cervical (C7)	*11*
Upper thoracic (T1)	*19*
Thoracic curve	**20/30**
Posterior fusion	*2*
Growing rod	*2*
None surgery	*16*

MEP of both upper and lower limbs!

Results

Correction of the cervicothoracic deformities (30)

Scoliosis (°)	*55.3-15.3-16.4 (72.3%)*
Kyphosis (°)	*81.3-22.3-22.9 (72.6%)*

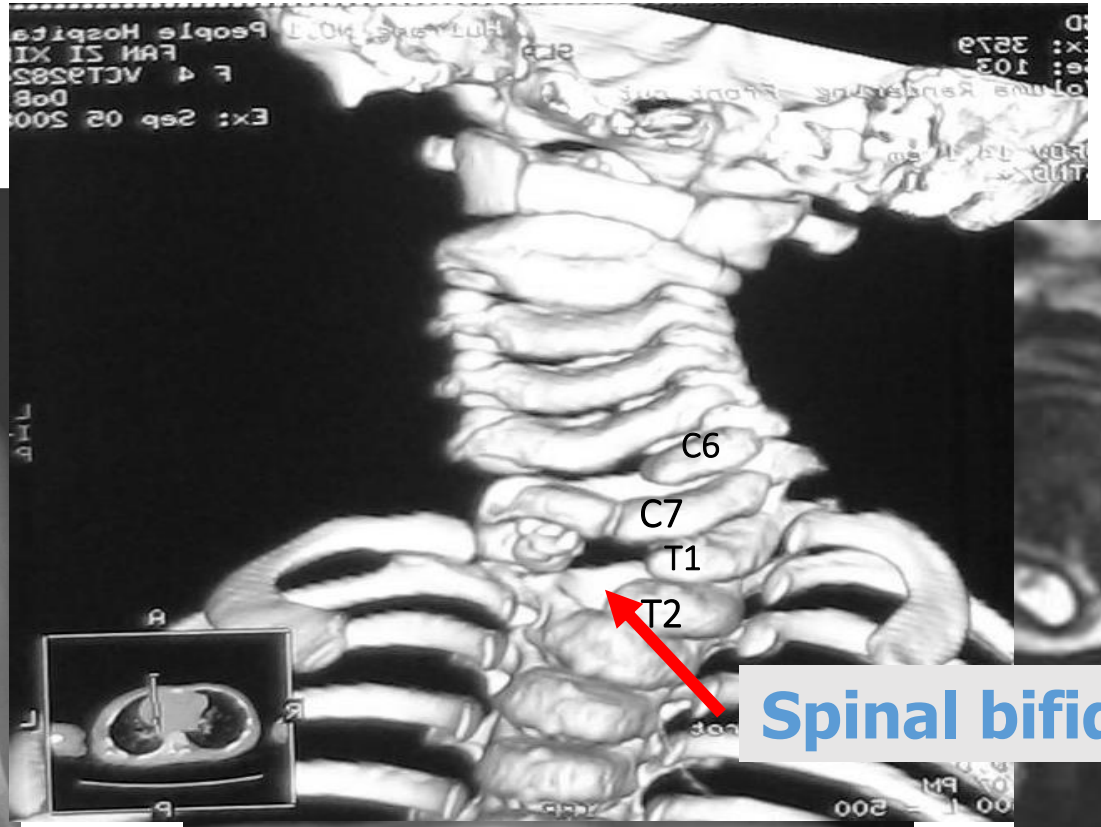
Spontaneous correction of the thoracic curves (16)

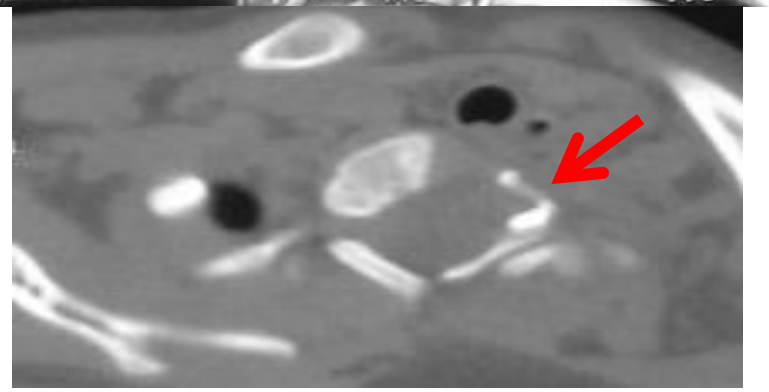
Scoliosis (°)	*37.1-16.6-19.1 (55.2%)*

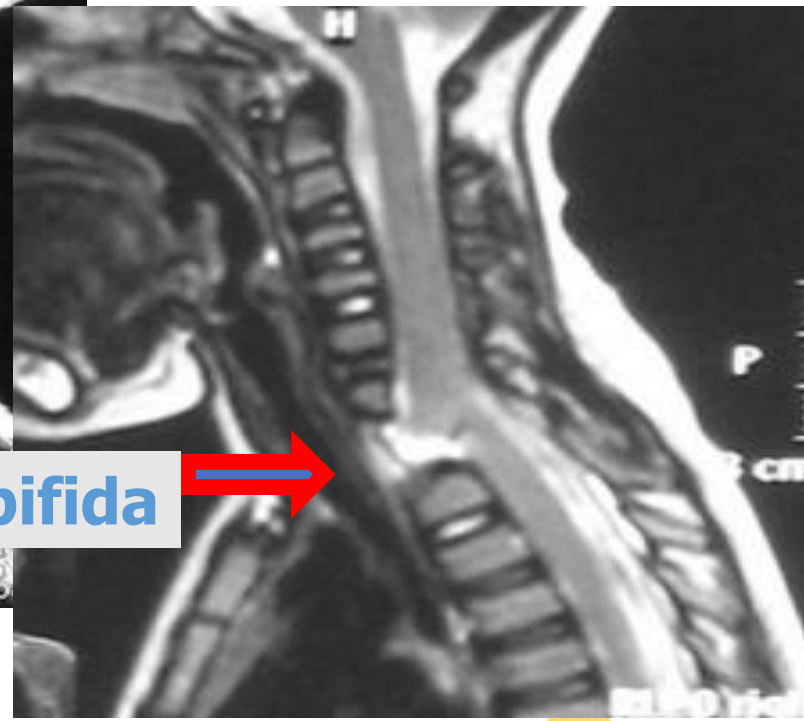
Surgical correction of the thoracic curves (4)

Scoliosis (°)	*80-25.5-27.3 (68.1%) –Fusion（2)*
Scoliosis (°)	*101-57-58.5 (43.6%)—Growing rod（2)*

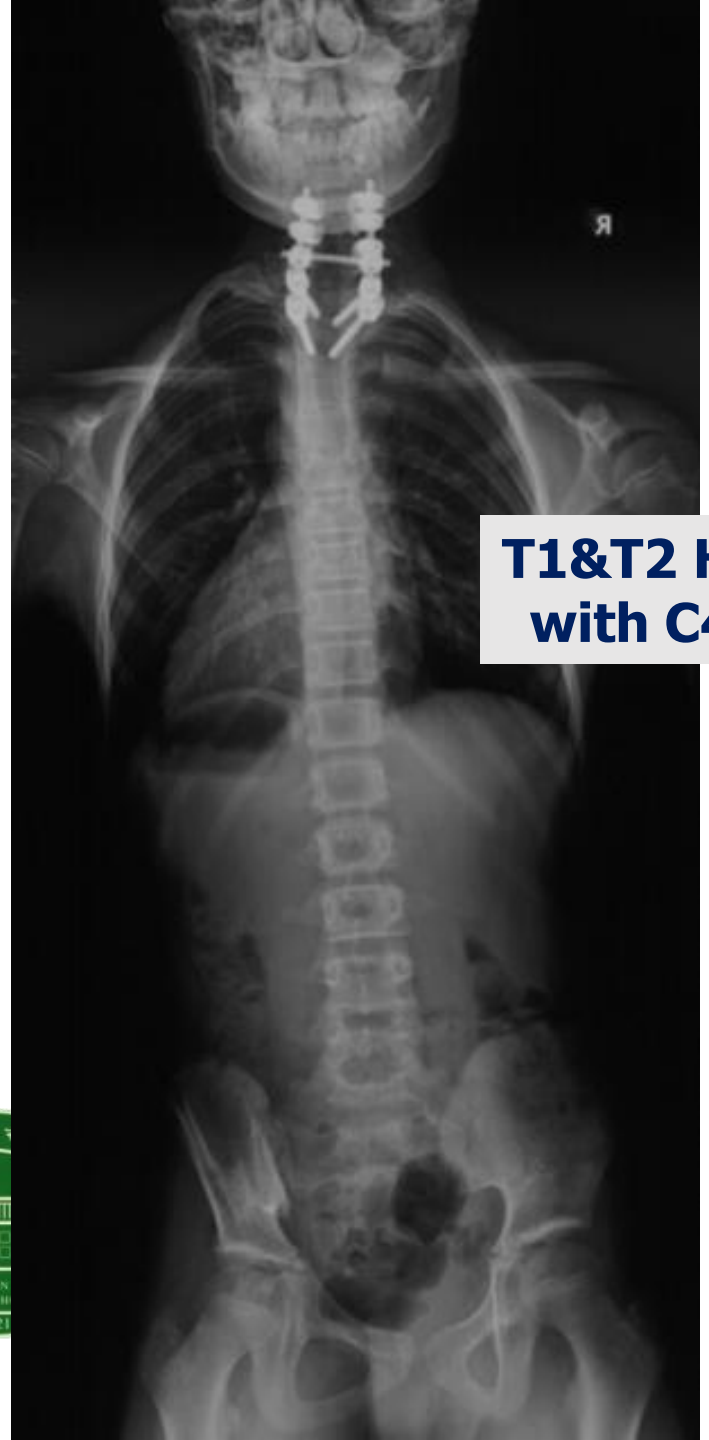
Case 1. F/5y







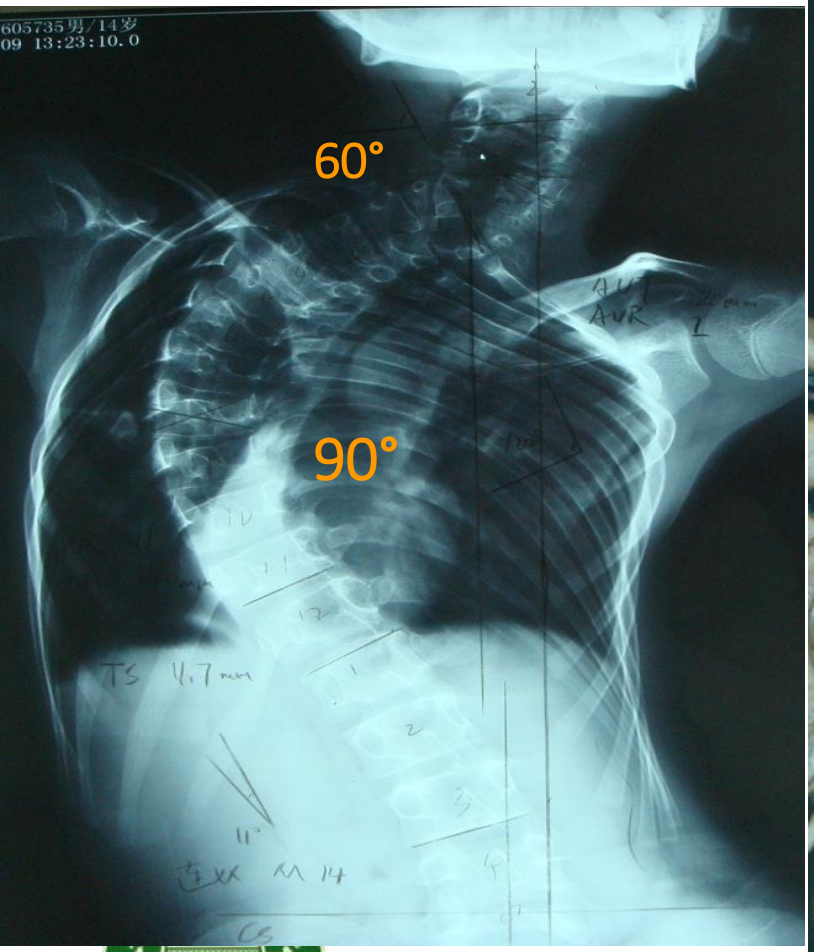
Spinal bifida

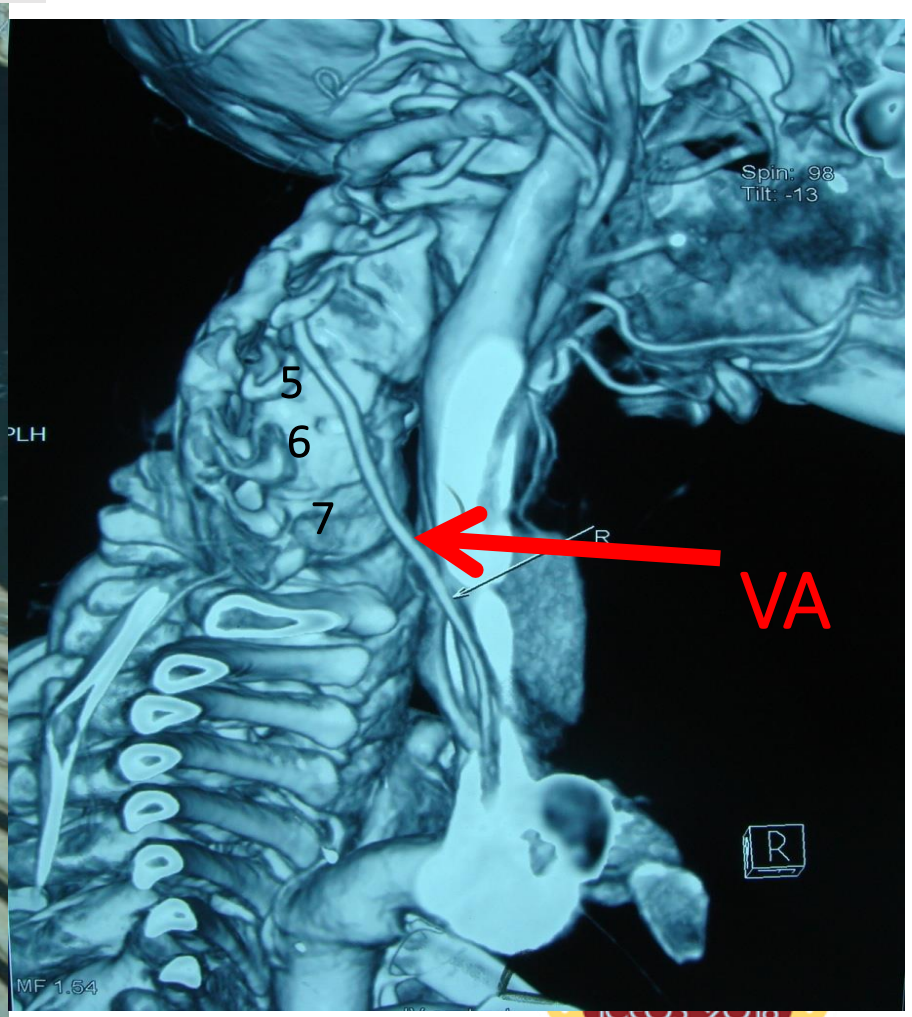


T1&T2 HV resection with C4-T4 fusion

5y Post-op

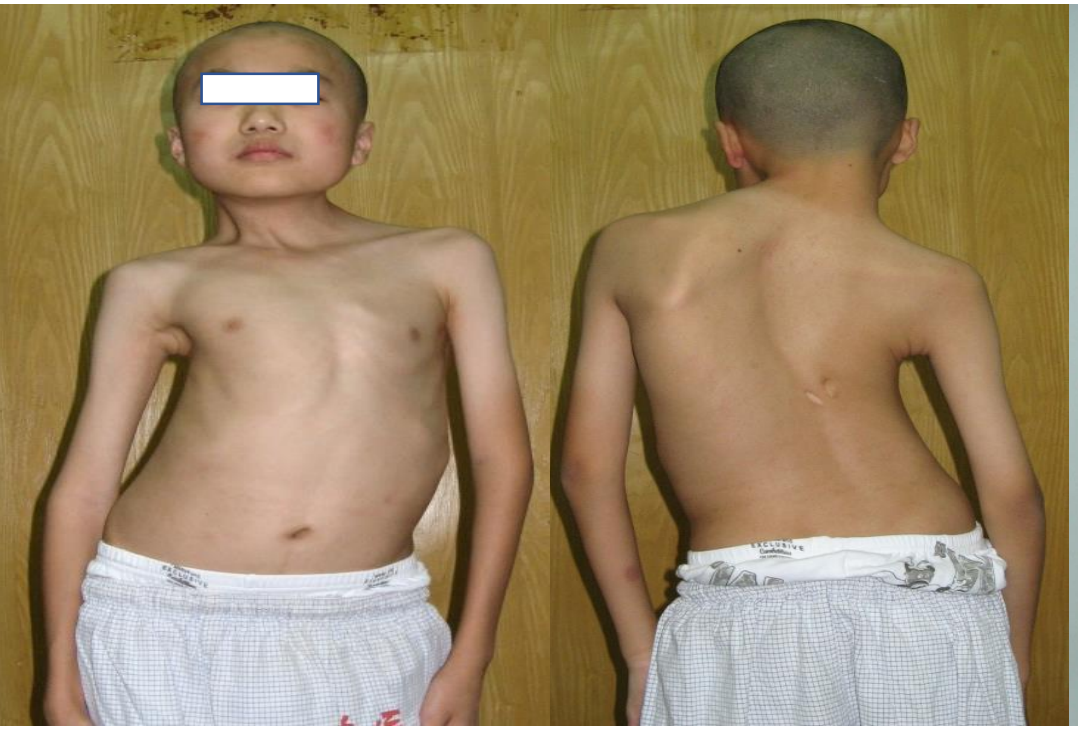
Case 3. M/14y



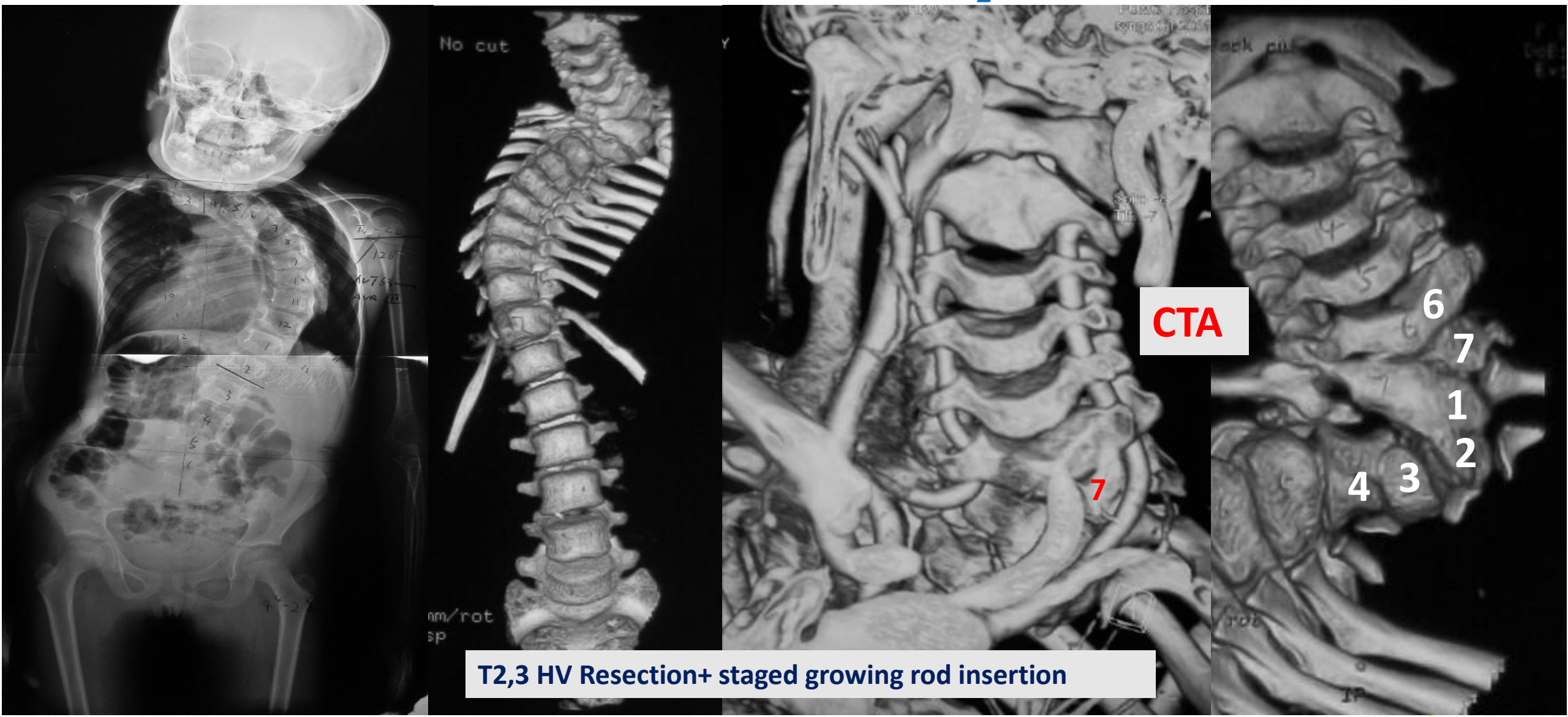


Combined A-P hemivertebra resection & fusion (C5-6) and staged T6 PSO with fusion C4-L3

4y Post-op

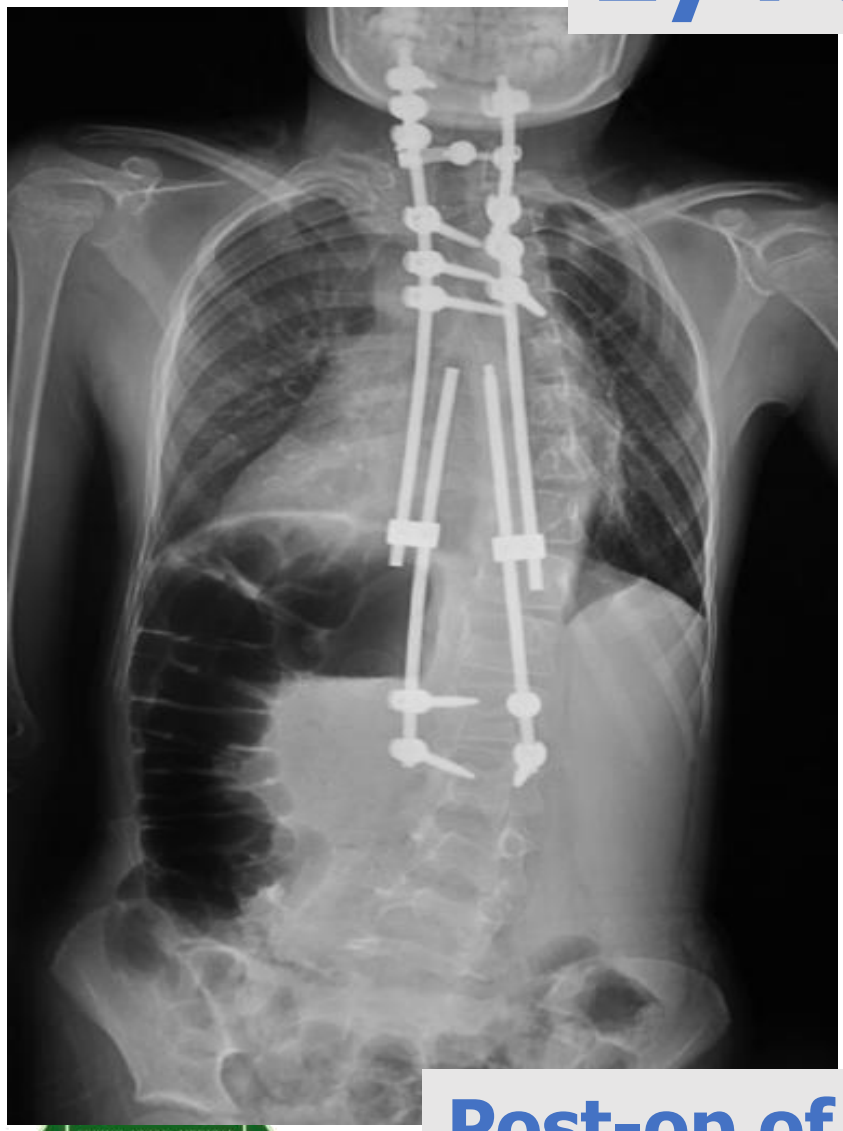


Case 5. F/8y



T2,3 HV Resection+ staged growing rod insertion

2y Post-1st op

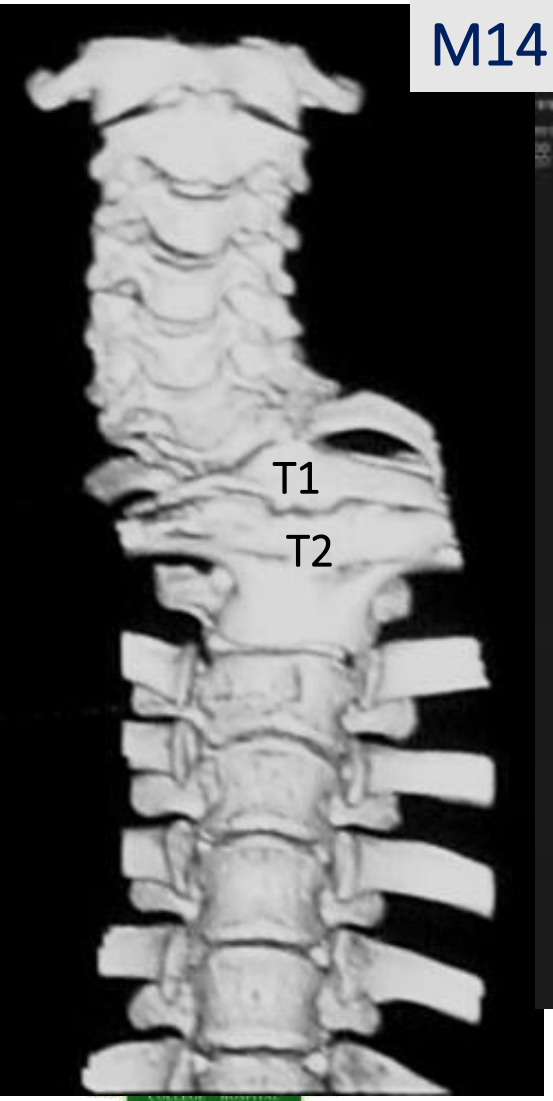


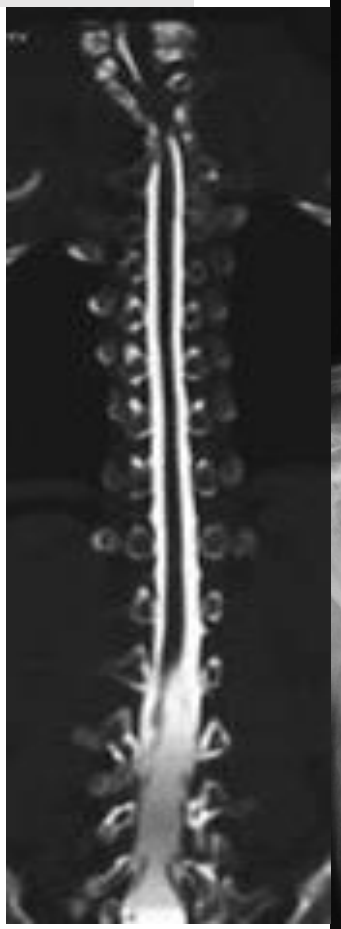
Post-op of 2nd lengthening

Complications（13）44%

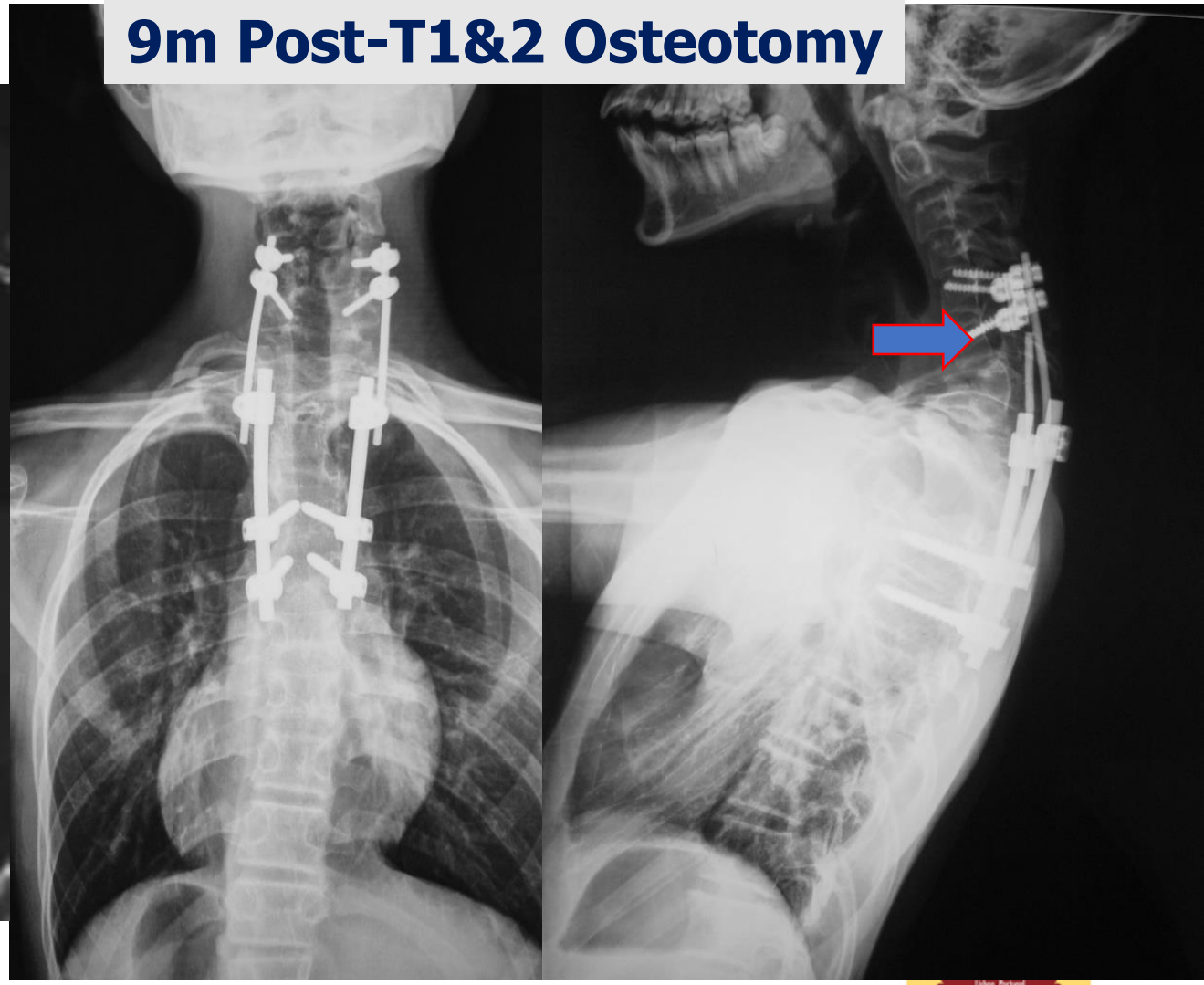
Transient root injuries	6	54%
Transient cord injury	1	
Implant failures	2	
Hemothorax	2	
Wound delayed Union	1	
Atelectasis	1	

M14 Walking difficulty





9m Post-T1&2 Osteotomy



Summary

Congenital cervicothoracic deformities

Not common but complicated deformities

3 column osteotomy ----Needed

Higher complications (40%)---Transient Brachial plexus palsy

CTA is essential for C7/T1 osteotomy to avoid VA injury

Staged surgery usually needed when with structural thoracic curve

Instrumentation requires combination of 3.5mm , 4.5mm or 5.5mm systems

Thanks!