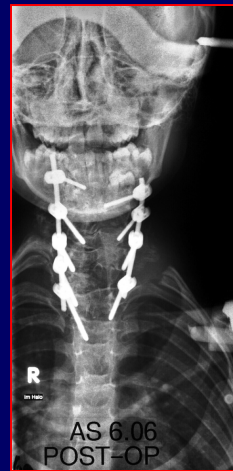


Posterior Hemivertebra/Bar Resection & Segmental Instrumentation in the Tx of Congenital Scoliosis at the Cervicothoracic Junction



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Sx Tx of CT Junction Congenital Scoliosis

CT junction congenital scoliosis requiring operative intervention is relatively rare

It may occur :

- isolated anomaly

- w/ other syndromes

- w/ congenital spine anomalies at other levels



Sx Tx of CT Junction Congenital Scoliosis

Operative Tx presents anatomical & technical challenges:

Patients often present w/ progressive deformities

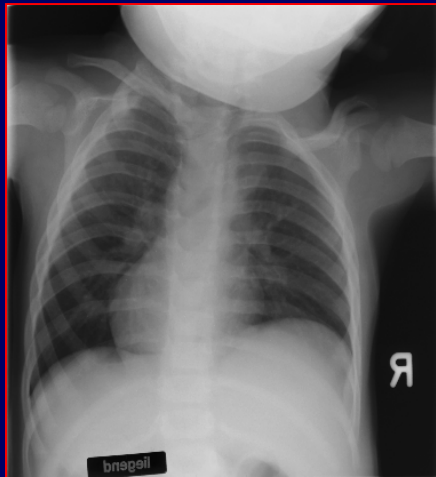
are often young & small

Anomalies may be complex

Brachial plexus nerve roots may not be sacrificed
w/o neurological deficit

Sx Tx of CT Junction Congenital Scoliosis

Goals of Tx :



prevent development of severe local deformities

prevention development of secondary structural curves

allow for normal growth in the unaffected spinal regions



Sx Tx of CT Junction Congenital Scoliosis

- Essentials of pre-op radiologic work-up -

PA & lateral full length spinal x-rays

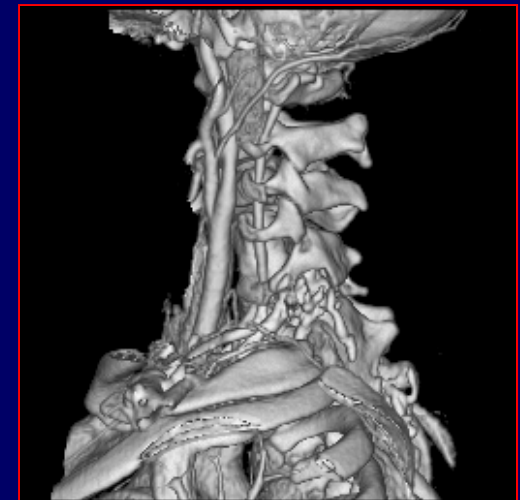
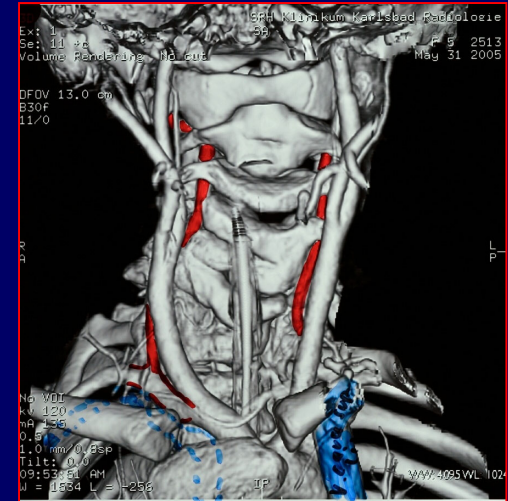
Entire spine MRI

- presence of intraspinal anomalies
- contribute to deformity progression
- require treatment
- increase risk of neuro complications

CT myelo w/ 3 D reconstructions

CT angiogram/angiogram

cases w/ instrumentation into C-spine



3 D CT reconstructions w/ arterial vessels

Sx Tx of CT Junction Congenital Scoliosis

- Posterior Approach to the CT Region -

Posterior resection of HV w/ or w/o osteotomy

Single stage procedure

Tong or halo placement

Prone position w/ pts. head away
from anesthesiologist:

easier access to deformity
facilitates instrumentation insertion
allows controlled deformity correction



SSEPs/MEPs are essential

Sx Tx of CT Junction Congenital Scoliosis

- Posterior Approach to the CT Region -

Posterior elements exposed **leaving periosteum left intact except where fusion is planned**

Preparation to proximal ribs in region to be resected

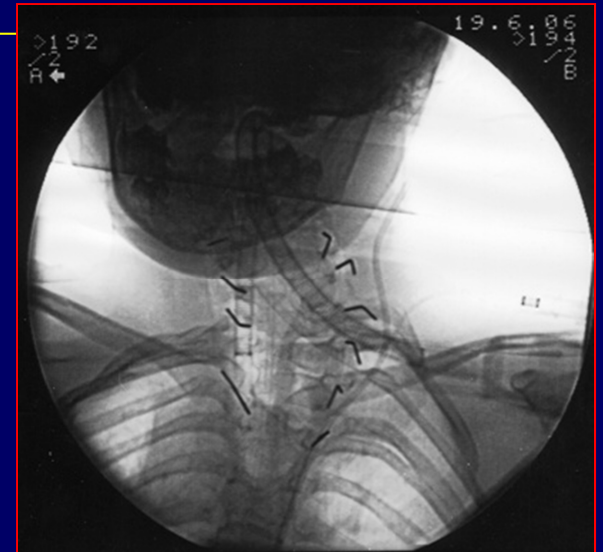
Entry points:

marked by fine needles

opened w/ small burr, & drilled w/ the appropriate drill bit

Drill-holes marked w/ thin K-wires & checked w/ image intensifier

Screw insertion



Sx Tx of CT Junction Congenital Scoliosis - Posterior Approach to the CT Region -

Removal of posterior elements of the HV

Undercutting of lamina above & below

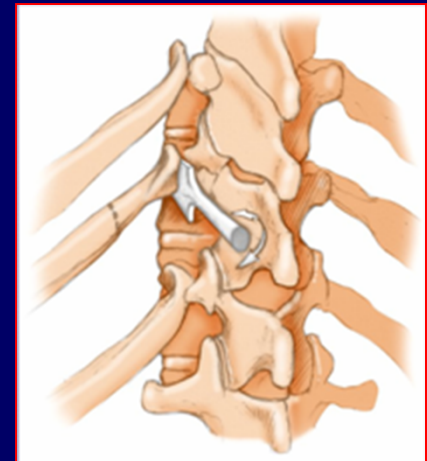
Resection of rib heads & proximal rib(s) at HV level

Removal of posterior pedicle

ID of spinal cord & nerve roots above & below the pedicle of HV

Maintain lower cervical & upper thoracic nerve roots comprising the brachial plexus

Rib synostoses may be resected



Sx Tx of CT Junction Congenital Scoliosis - Posterior Approach to the CT Region -

Extrapleural blunt exposure of HV lat wall & ant body

Protection of ant vessels & structures w/ blunt spatula

Removal of remainder of pedicle

Exposure of post HV body

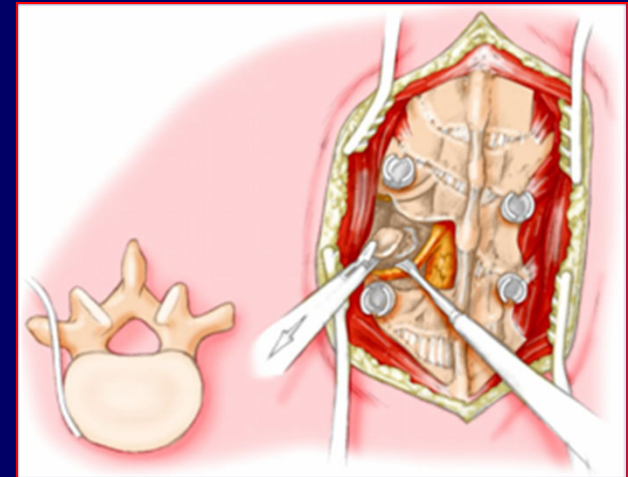
Protection of spinal cord

Temporary rod placement on concavity

Complete removal of discs adjacent to HV

Mobilisation & removal of HV body

Osteotomy in case of bar formation



Access to lat & ant vertebral body
Resection of posterior pedicle

Sx Tx of CT Junction Congenital Scoliosis - Posterior Approach to the CT Region -

Vertebral endplate debridement

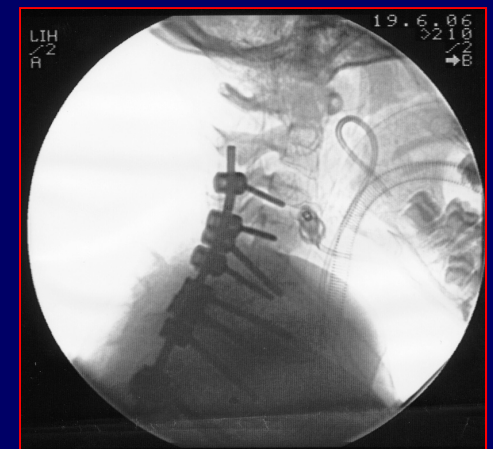
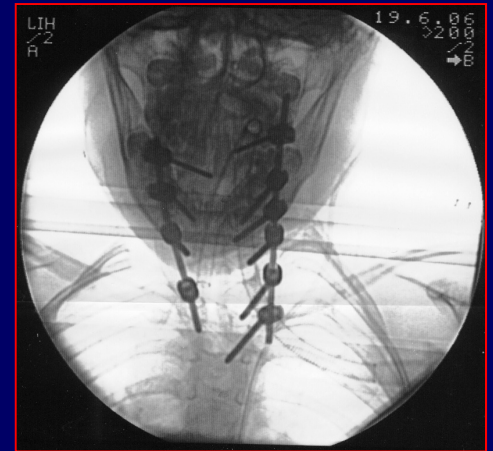
Ant column support in cases of pronounced kyphosis

Definitive rod placement

Convex compression until the gap closes

Addition of HV cancellous bone to facilitate bony fusion

Check spinal cord & nerve roots for adequate space



Sx Tx of CT Junction Congenital Scoliosis

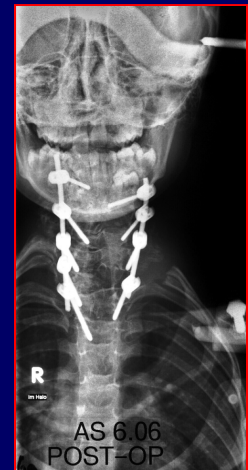
- Posterior Approach to the CT Region -

Instrumentation length depends on bone size & quality in relationship to the stresses on vertebra & instrumentation needed to achieve/ maintain correction

Cervical screws placed to provide additional stabilization of the construct, may be removed at 3 (– 6) mos. to allow for cervical mobility

Halo body jacket provides external protection for the first 2- 3 mos. post-op

Graded diameter rods allow for placement in different size screw heads



Sx Tx of CT Junction Congenital Scoliosis

Posterior Approach to the CT Region

- Methods -

Retrospective review

7 pts. (4F,3M)

Congenital scoliosis at the CT junction (C6 – T3)

C6	0
C7	1
T1	2
T2	1
T3	2
Bar C7- T3	1

Surgically treated 12.01 - 3.07

All had ≥ 2 y follow- up (2 yrs – 9 yrs + 5 mos)

Mean age at surgery: 10 yrs (3 yr + 2 mos – 15 yr + 8 mos)

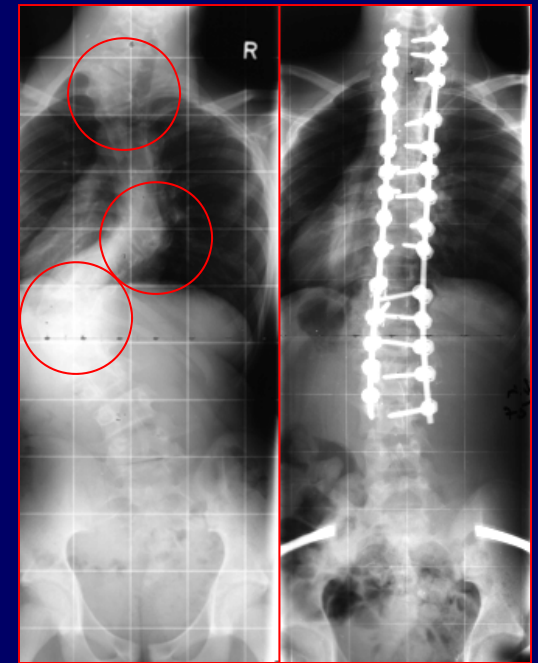


Sx Tx of CT Junction Congenital Scoliosis

Posterior Approach to the CT Region

- Results -

- 4 additional congenital spinal anomalies requiring Sx
- 4 Klippel Feil syndrome (1/4 Goldenhar syndrome)
- 2 scoliosis below the congenital scoliosis pre-op & post-op that have not required surgical intervention to date
- 1 cervical kyphosis pre-op which remained stable



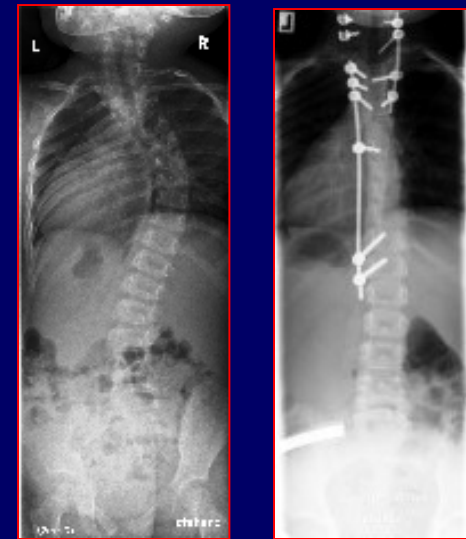
T1a, T8a, T12/L1

Sx Tx of CT Junction Congenital Scoliosis

Posterior Approach to the CT Region

- Results -

Pre-op mean curve : 37° (20° - 60°)
Post-op mean curve : 1.4° (0° - 10°)
Maintained at last follow – up
Mean % correction: 97% (78 -100%)



Halo body jacket used for 3 mos. post-op in 2/7 pts.
who were instrumented into lower cervical spine

Sx Tx of CT Junction Congenital Scoliosis

Posterior Approach to the CT Region

- Complications -

6 complications in 5 pts

2 nerve root irritations post-op (resolved)

2 pts. instrumented into lower thoracic region required revisions 2° to screw loosening in that region

1 post – op pneumonia & pleural effusion

1 Horner syndrome

Sx Tx of CT Junction Congenital Scoliosis

Posterior Approach to the CT Region

- Conclusions -

Posterior HV/ bar resection at the CT junction is technically demanding
It requires special attention to anomalies in the osseous anatomy,
vascular anatomy and the presence of the brachial plexus

Congenital spinal anomalies are often present at other levels of the spine
These may require operative intervention

Sx Tx of CT Junction Congenital Scoliosis

Posterior Approach to the CT Region

- Conclusions -

Short segment resection & fusion w/ correction & instrumentation allows for a balanced spine in the sagittal & coronal planes

It prevents the development of 2° curves which may become structural w/ growth & time

Patients require regular follow-up until the end of growth to assure that the desired spinal balance is maintained