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Coronal Cervical Deformity

- Is There a Role for Osteotomies?

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No Disclosures

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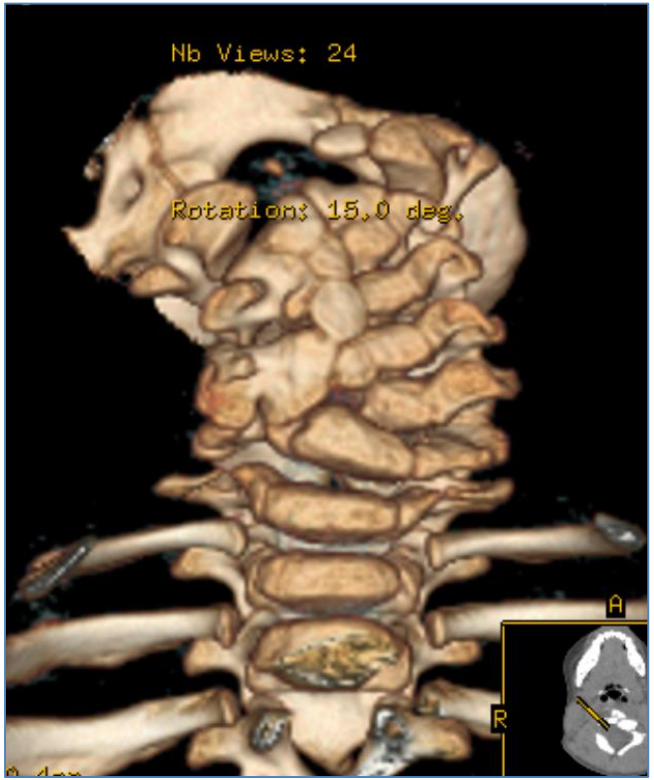
Coronal Cervical Deformity

Is there a role for osteotomies?

- **Correction required**
  - **Severe deformity**
  - **Progression expected during growth**
  - **Insufficient compensation**
- **Rigid deformity**
  - **Synostosis**
  - **Bar formations**

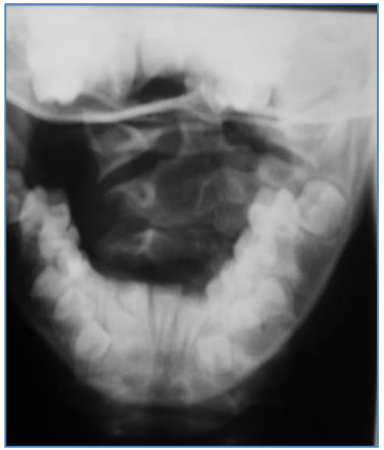
Osteotomy should be considered



Coronal Cervical Deformity

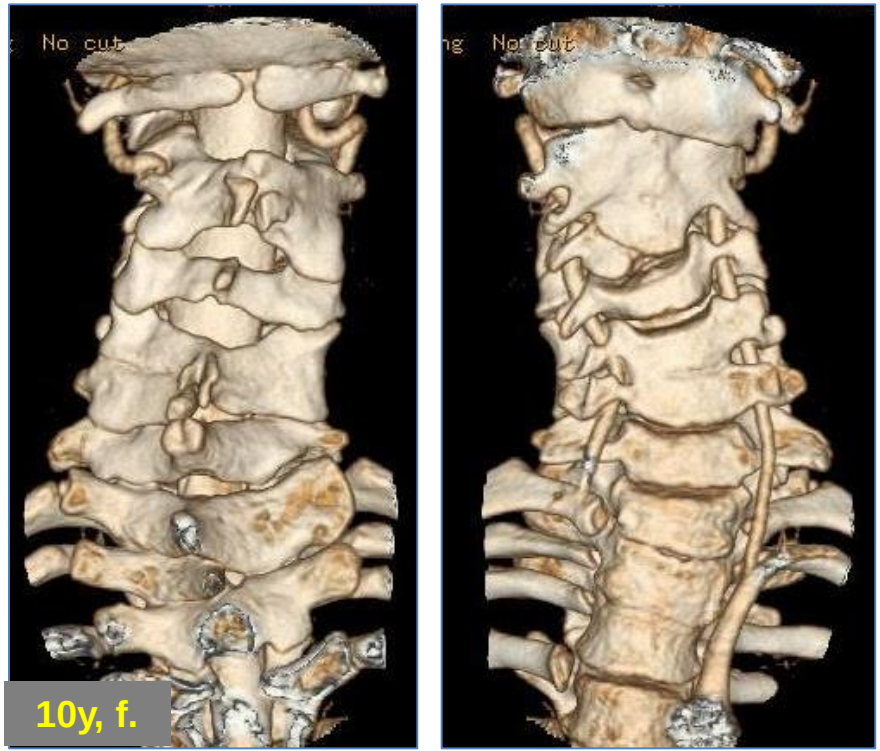
Problems

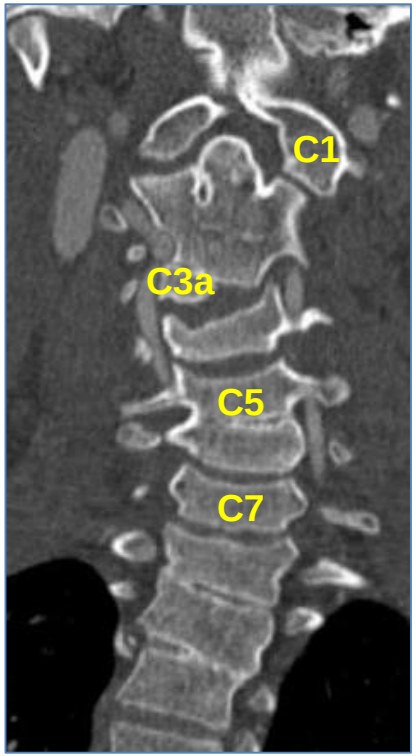
- Often associated with other anomalies (Klippel Feil)
- Few mobile segments
- Less possibility for compensation (coronal plane)
- Head obliquity
- Trunk shift to the convexity of the deformity
- Compensatory curves in the thoracic spine
- Risk of instability and myelopathy



Coronal Cervical Deformity

Klippel Feil/ mobile segments





HV C3a, Synostosis Occ./C1, C2-C3a, C5/6

- **few mobile segments**
- **less possibility for compensation**

Coronal Cervical Deformity

Trunk balance

Sagittal plane

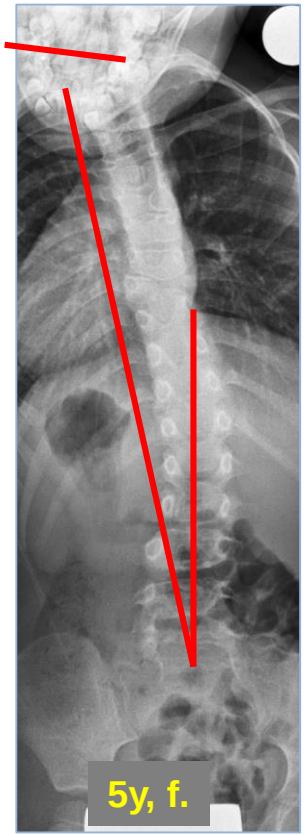
14y, m.

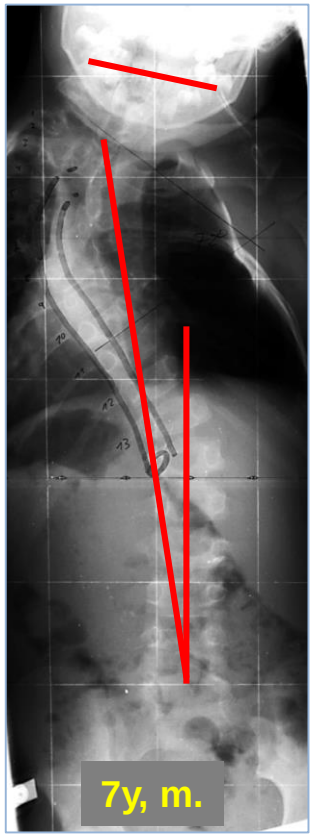
Coronal plane

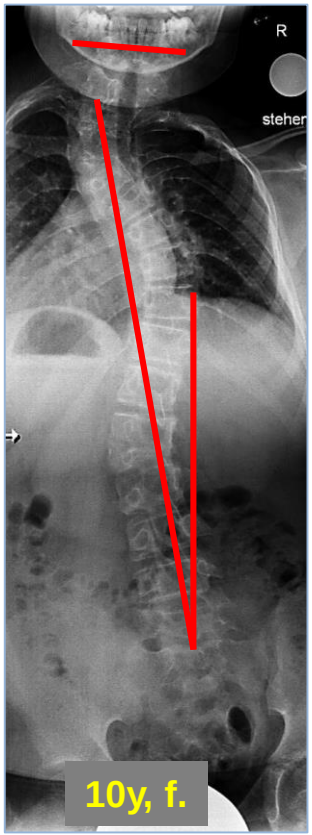
15y, m.

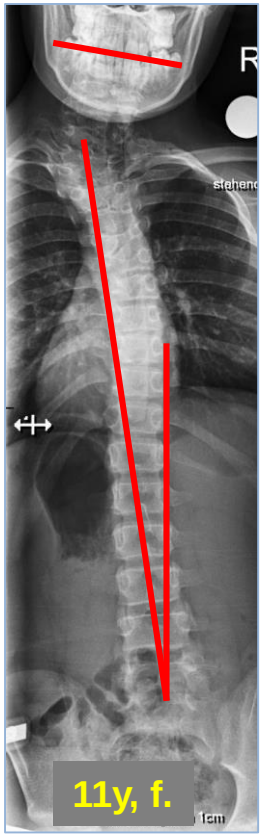
Coronal Cervical Deformity

Trunk balance





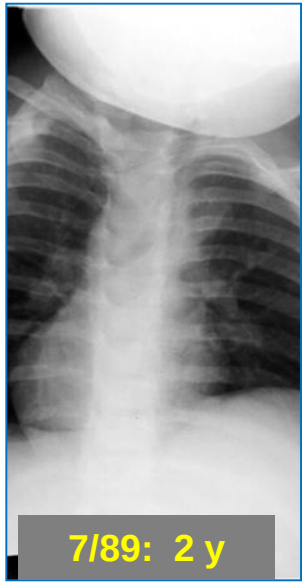


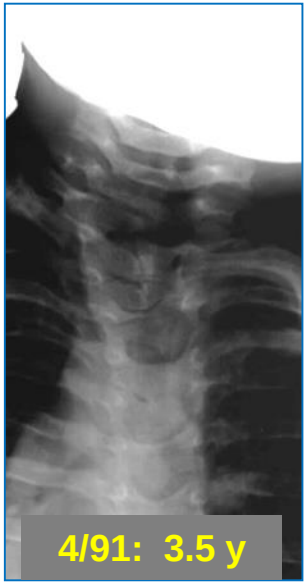


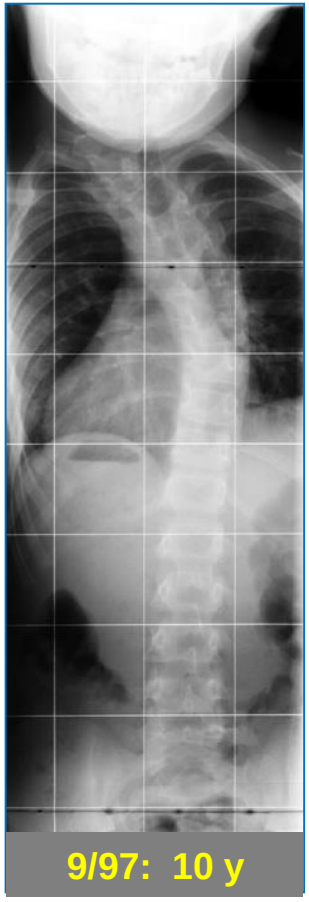
Ruf M, Hassanain A, Letko L, Pitzen T. *Correlation between Head Position and Trunk Shift in Congenital Cervicothoracic Junctional Deformities.* ICEOS, Boston 2014

Coronal Cervical Deformity

Compensatory curves







HV C3a and C7

- **compensatory thoracic scoliosis**
- **trunk shift to the convex side**

Coronal Cervical Deformity

Goals

- Correction of the deformity in frontal and sagittal plane
- Sacrifice as less mobile segments as possible
- Resection of the hemivertebra and the adjacent disc
- Wedge osteotomy within the fused area

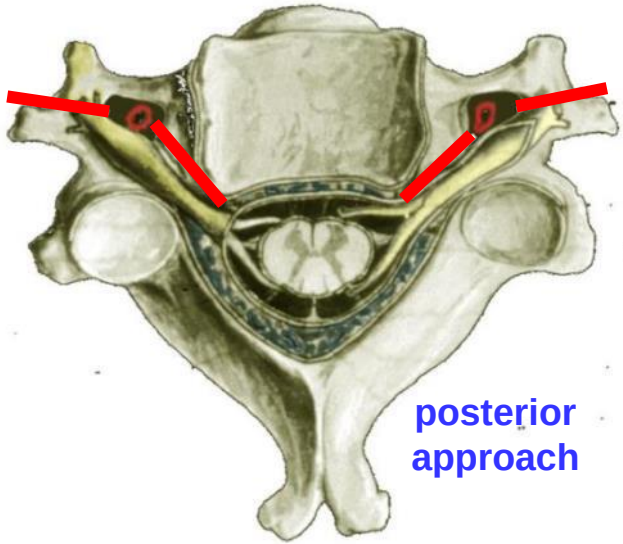
Coronal Cervical Deformity

Technique

- **posterior approach:**
  - **resection of the posterior parts of the HV**
  - **decompression/ exposure of spinal cord, nerve roots, vertebral artery**

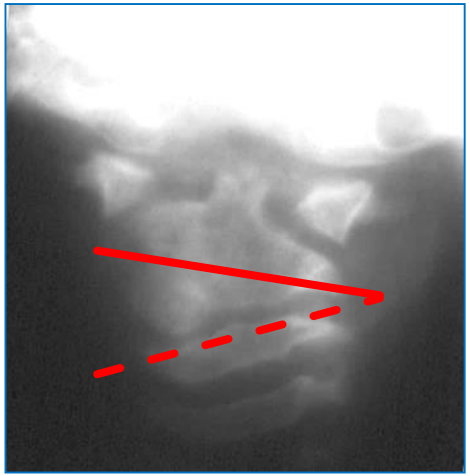
- **anterior approach:**
  - **resection of the anterior parts of the HV**
  - **exposure of the vertebral artery**
  - **reduction (and instrumentation)**

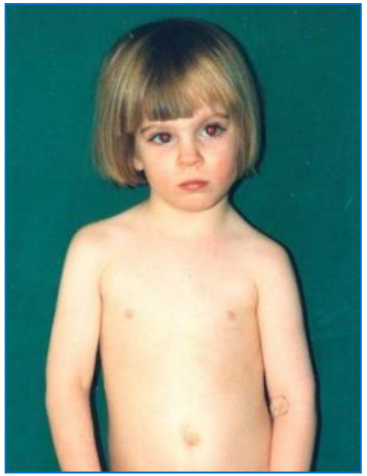
- **posterior approach (if necessary):**
  - **posterior instrumentation**



Ruf M, Jensen R, Harms J.
Hemivertebra Resection in the Cervical Spine.
Spine 2005;30(4):380-5.

K.V., f., 4 y. Hemivertebra C2a left, semi-segmented

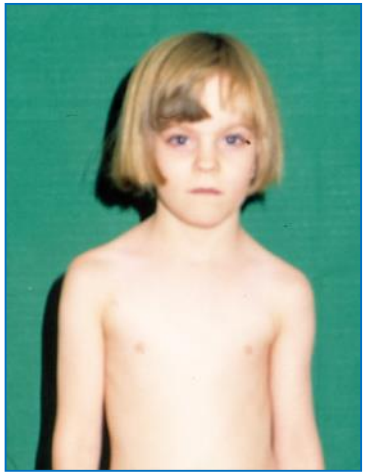




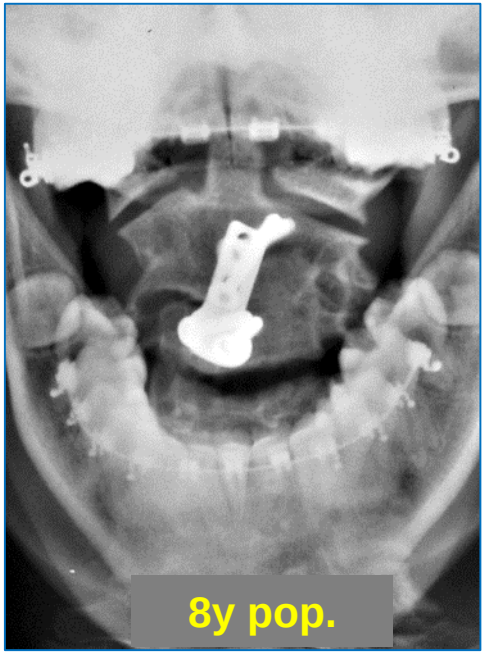
- **Posterior-anterior osteotomy C2,**

  resection of the hemivertebra and the adjacent rudimentary disc,

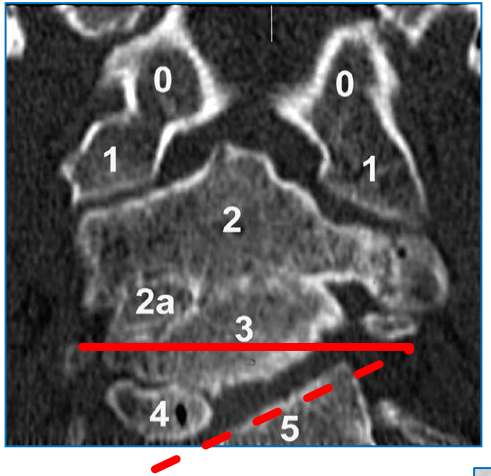
  fusion C2/3

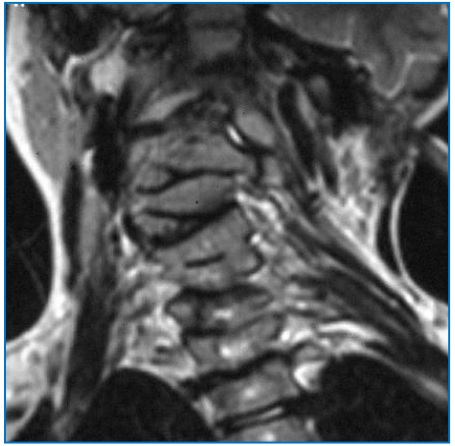


K.V., f., 4 y. Hemivertebra C2a left, semi-segmented



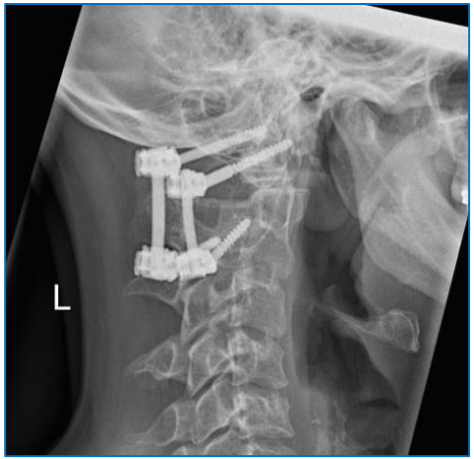
F.K., 8y, f. HV C2a + C4, atlantoocc. synostosis, bloc C5/6

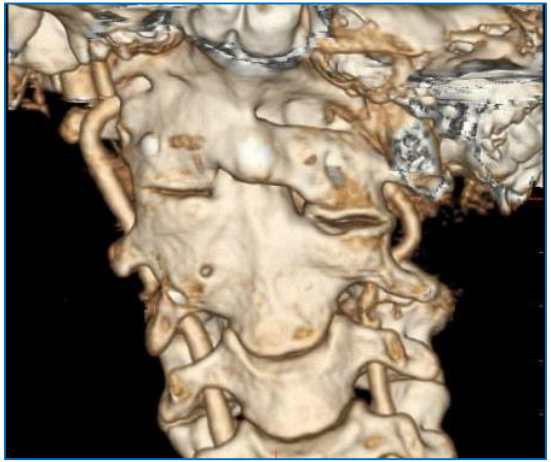


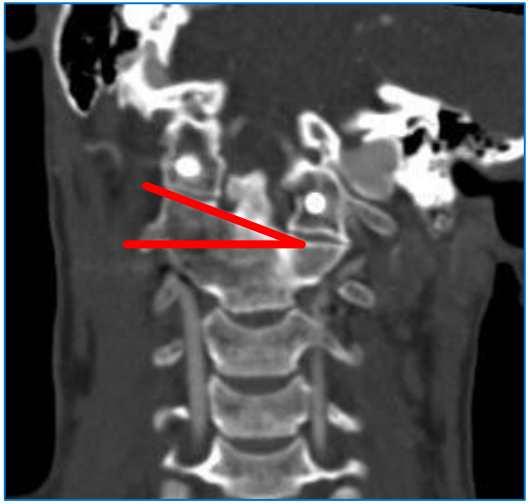


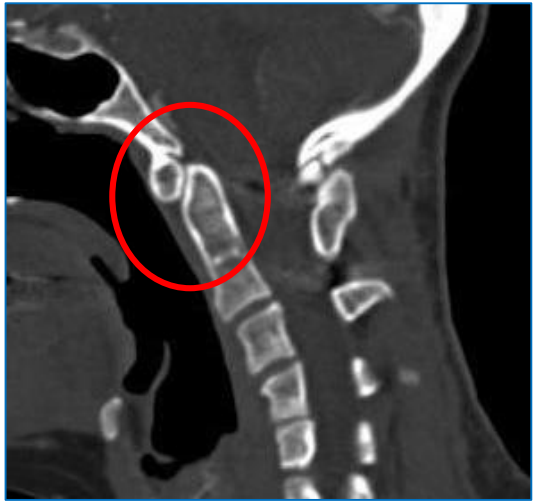
- Posterior-anterior-posterior osteotomy C3, resection C4, fusion C2-5
- Postop. C5 root lesion, resolved with shorter screw

A.E., 42y, f. Synostosis Occiput-C1, hemivertebra C2, status post instrumentation C1-3





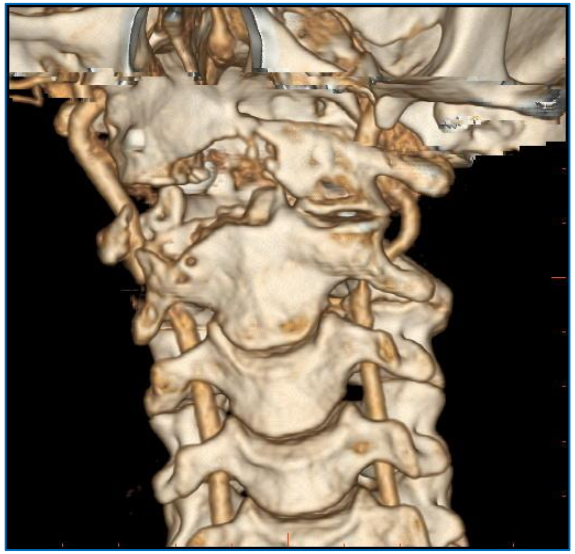


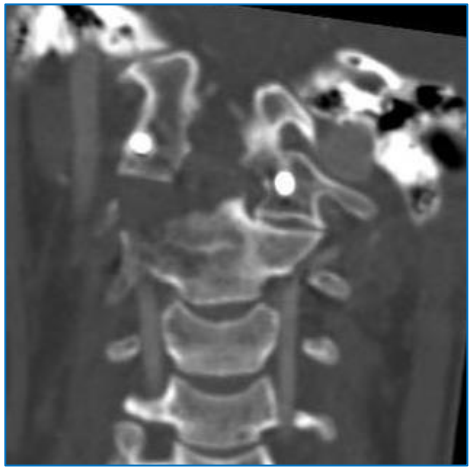


- **Wedge osteotomy of C2**
- **Visualisation of the vertebral artery**
- **Resection of the odontoid to prevent encroachment of the brain stem**

First surgery:

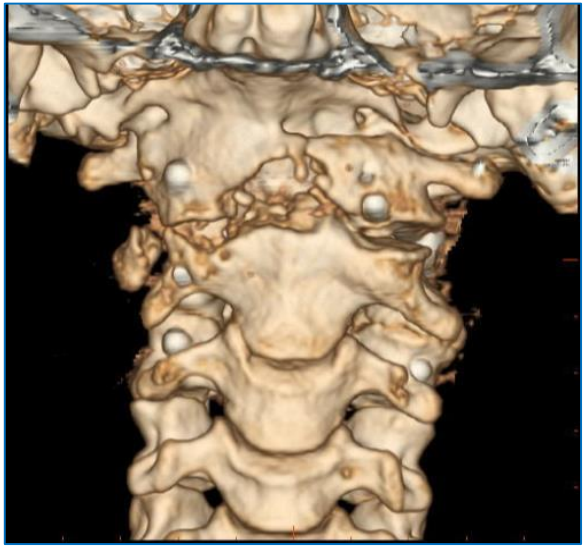
- transoral approach
- visualization of the vertebral artery
- resection of the vertebral body of the hemivertebra C2
- resection of the odontoid

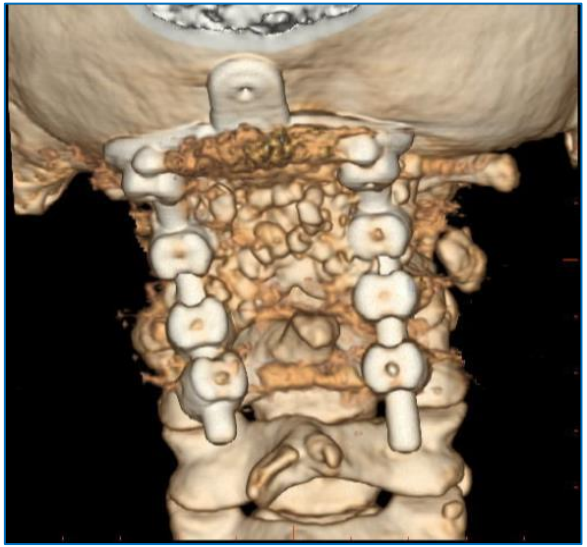


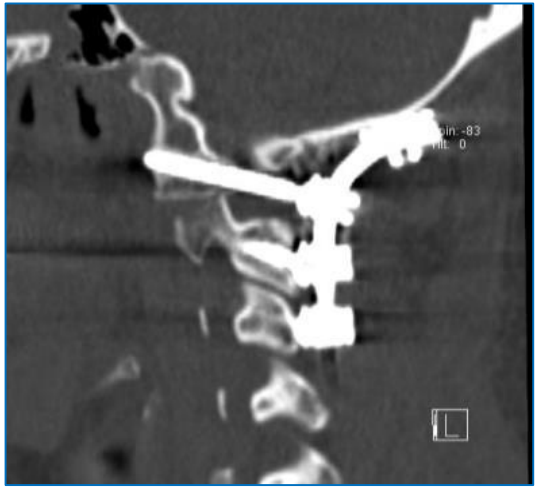


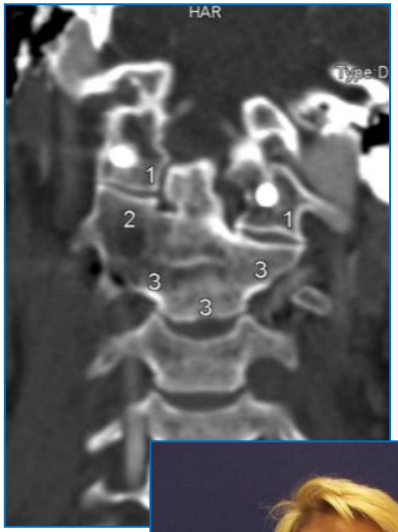
Second surgery:

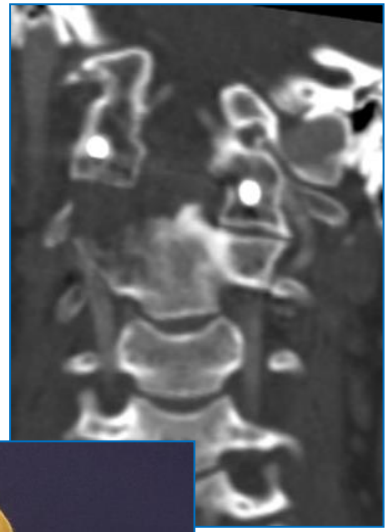
- posterior approach
- instrumentation Occiput to C4
- visualization of the vertebral artery
- resection of the lamina and pedicle of the hemivertebra
- compression at the convex side / closing the gap

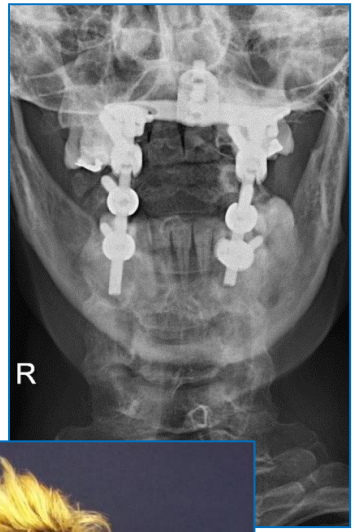


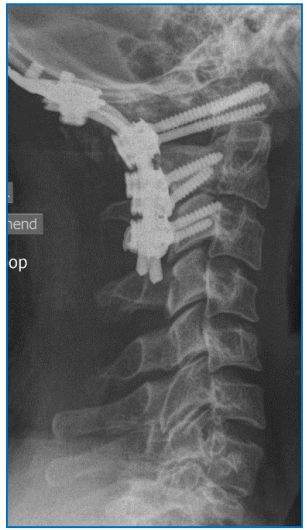


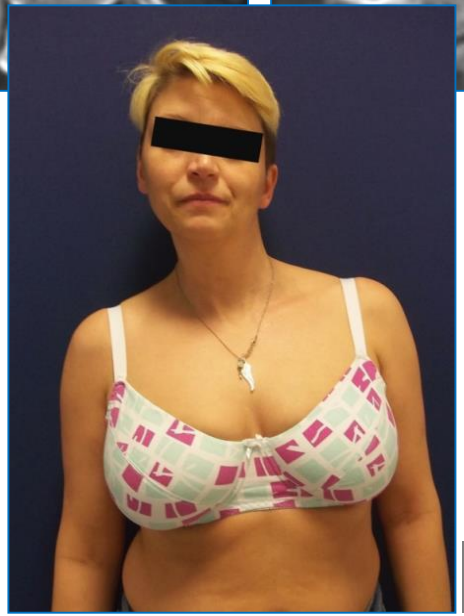




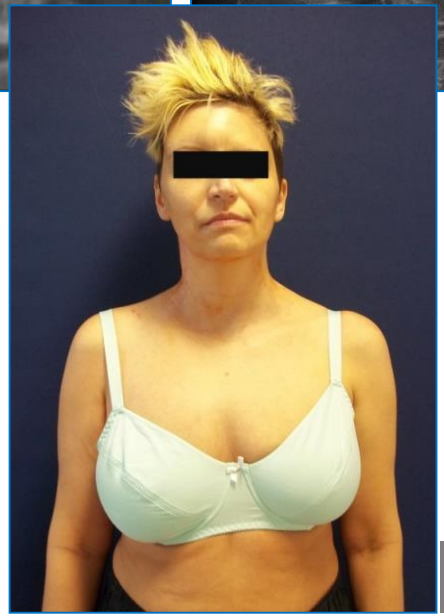






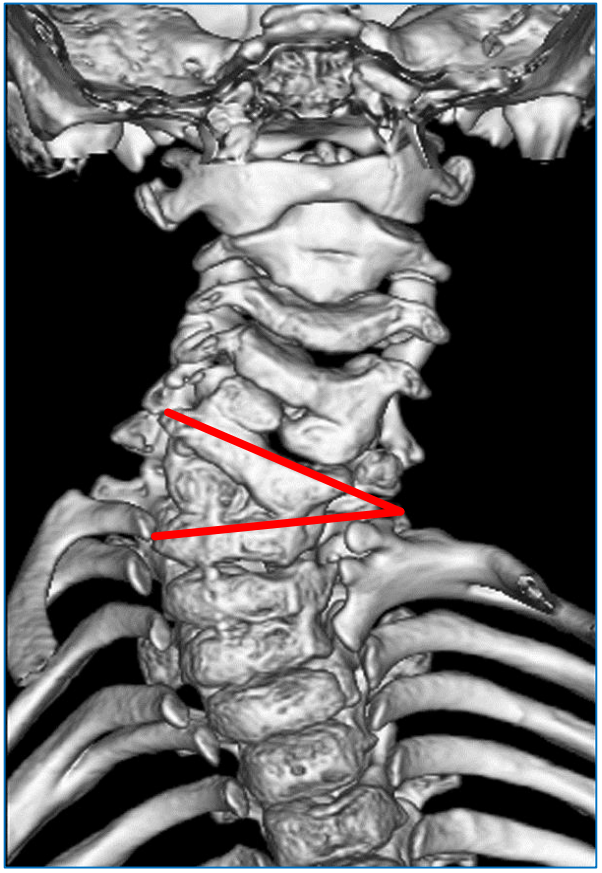


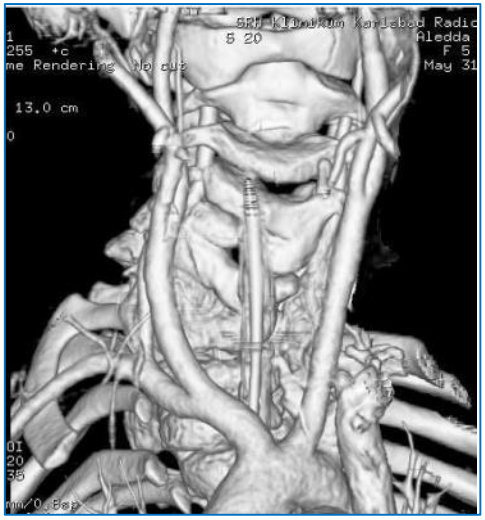
preop



postop

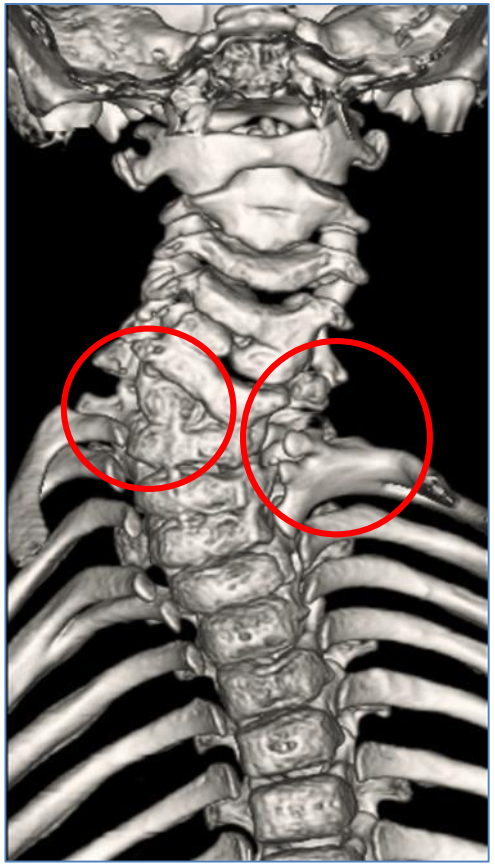
A.S., 6y f. Klippel-Feil, hemivertebra C7, concave bar and rib synostosis T1-3





A.S., 6y f. Klippel-Feil, hemivertebra C7, concave bar and rib synostosis T1-3

- Transpedicular screw placement
- Resection of the laminae, visualization of the spinal cord and the nerve roots
- Resection of the hemivertebra C7
- Wedge resection of T1
- Insufficient mobility, resection of the concave rib heads/ rib synostosis
- Compression via the instrumentation

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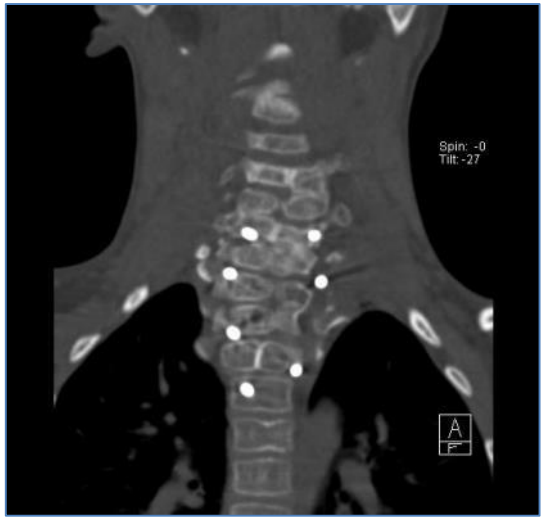
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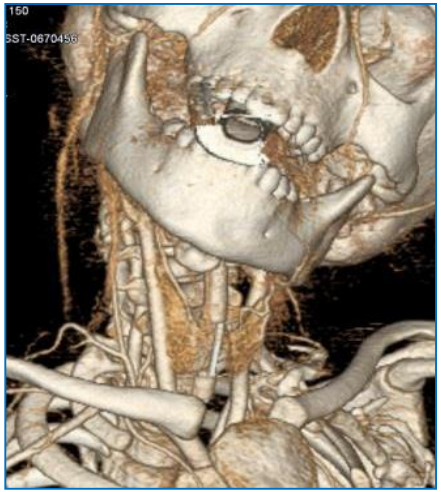
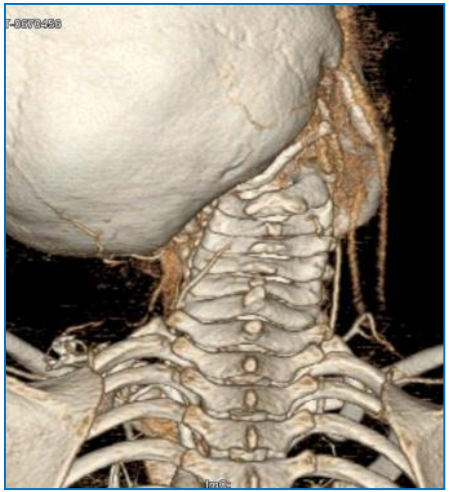
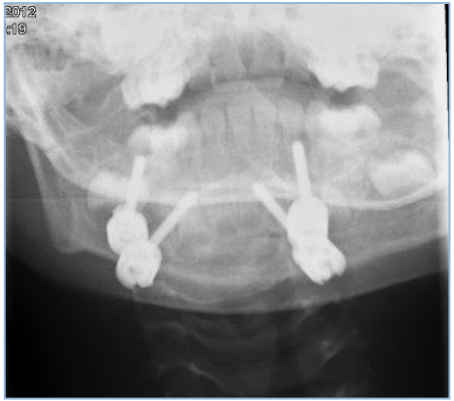


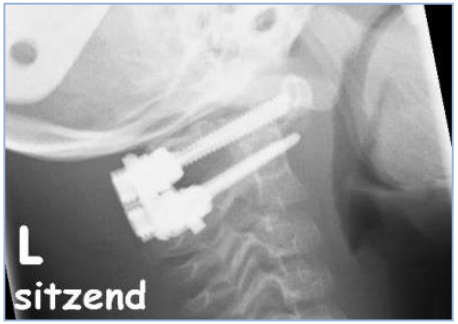


Osteotomy?

K.L. 4y, m.

Rot.-lux. C1/2, muscular torticollis, insufficient treatment



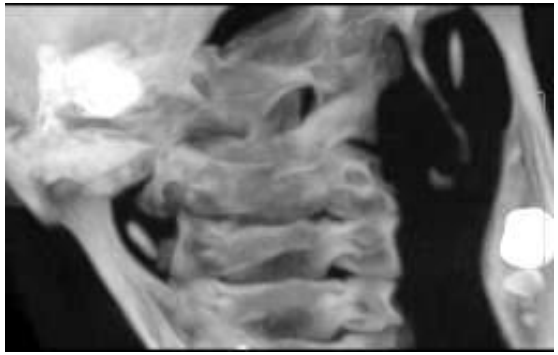


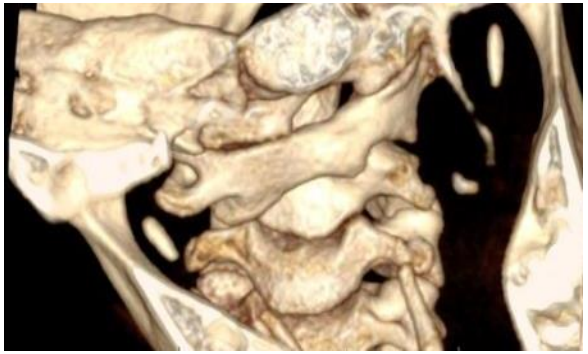
Sectioning of the sternocleidomastoideus muscle, halo extension

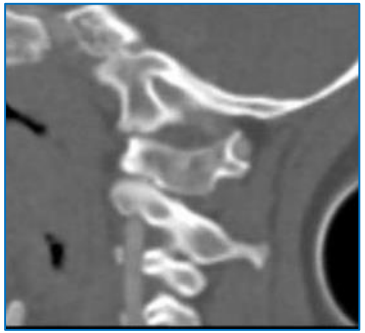
Osteotomy?

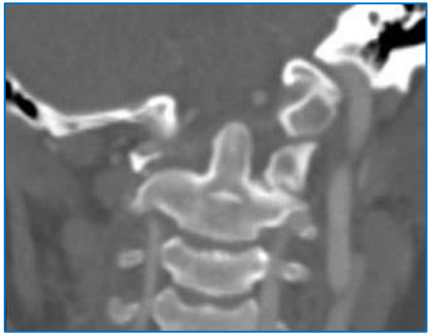
B.C. 8y, f.

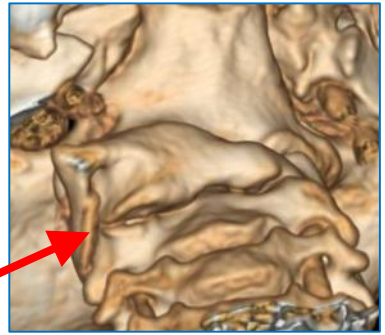
Rot.-lux. C1/2, minor trauma one year ago



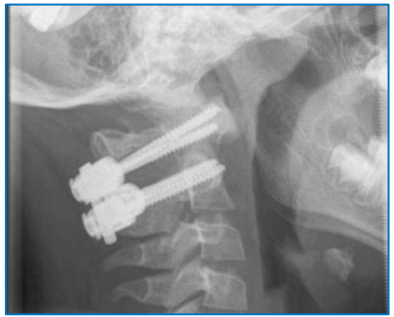








- Halo extension
- insufficient correction
- anterior release



Coronal Cervical Deformity

- Conclusion -

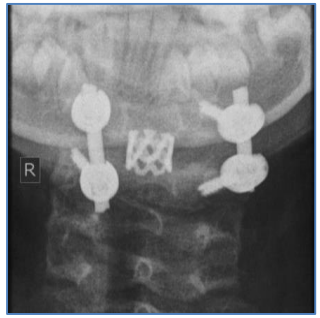
There is a role for cervical osteotomies!

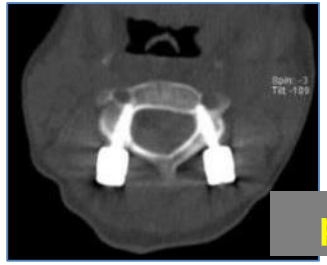
- **Correction of rigid deformities in frontal and sagittal plane**
- **Preservation of mobile segments**

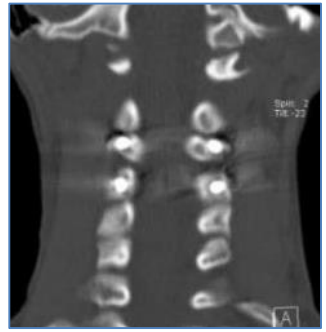
But…

consider early correction before rigidity increases and osteotomy is necessary!

C.L., 7y, f.
hemivertebra
C4 left







Thank you