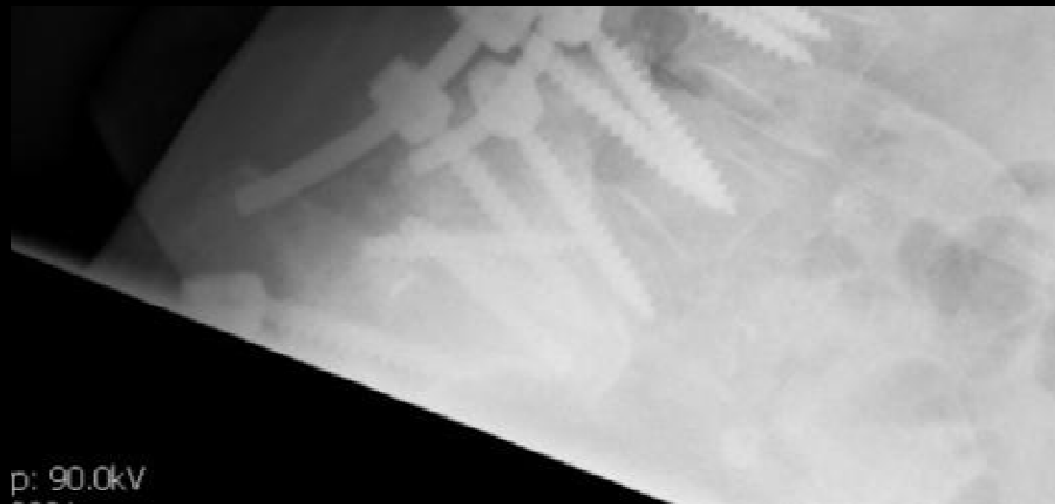


# Surgical techniques

- Anterior column lengthening
- Smith-Peterson osteotomy
- PSO: pedicle subtraction osteotomy
- VCR: vertebral column resection







Großes Allograft  
(Schenkelhals) bei L5/S1  
und dorsale  
Verlängerung

LWK 5



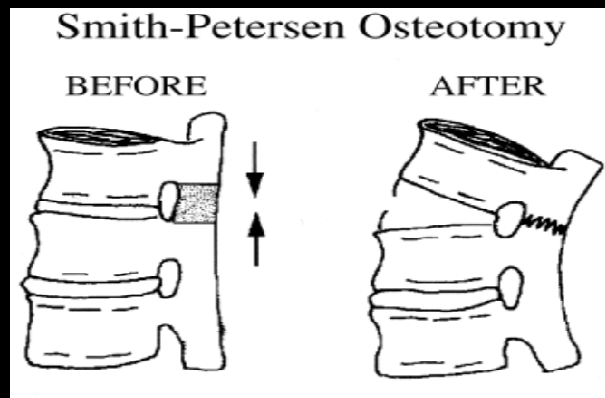
SWK 1



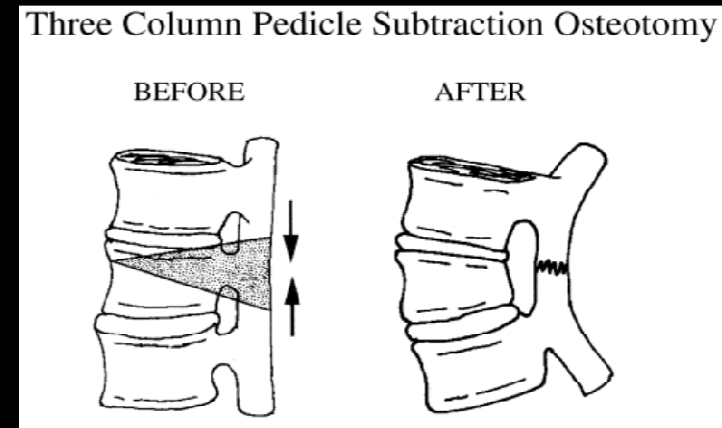
stehend

stehend

# Korrekturmöglichkeiten des sagittalen Profils



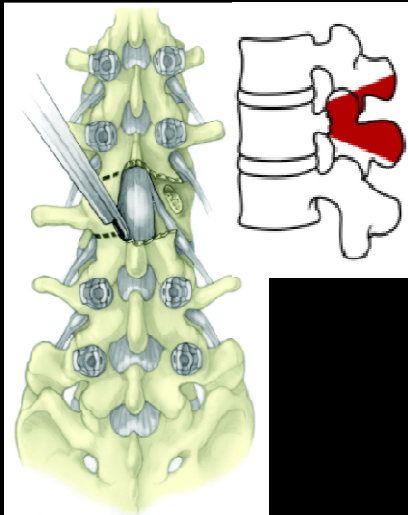
- dorsal verkürzend
- technisch einfach
- vorne verlängernd
- Geringer Korrektureffekt



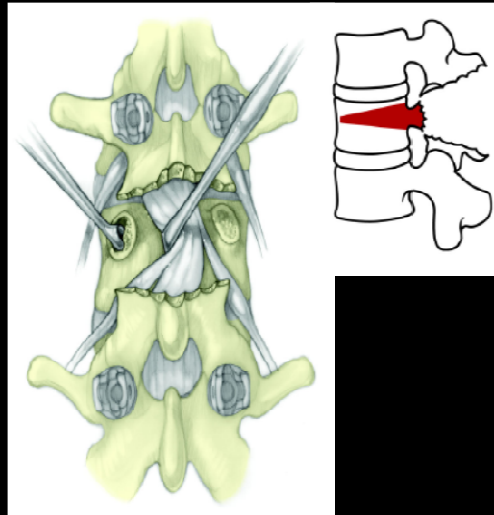
- dorsal verkürzend
- geringes Pseudarthrosenrisiko
- größerer Korrektureffekt
- technisch anspruchsvoll
- Blutverlust

# Technique of PSO

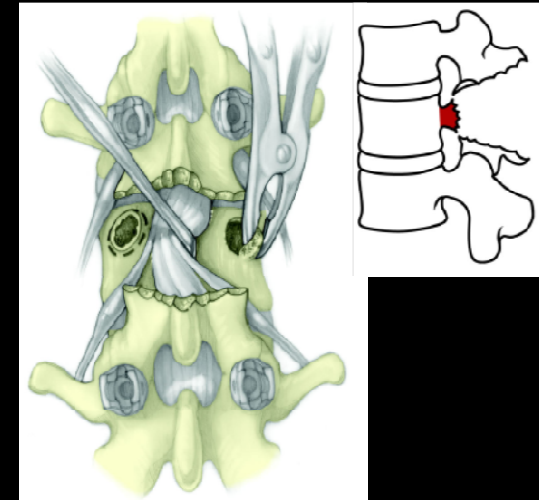
*Bridwell, JBJS 2003*



laminectomy,  
fasettectomy  
identify dura and  
nerve roots

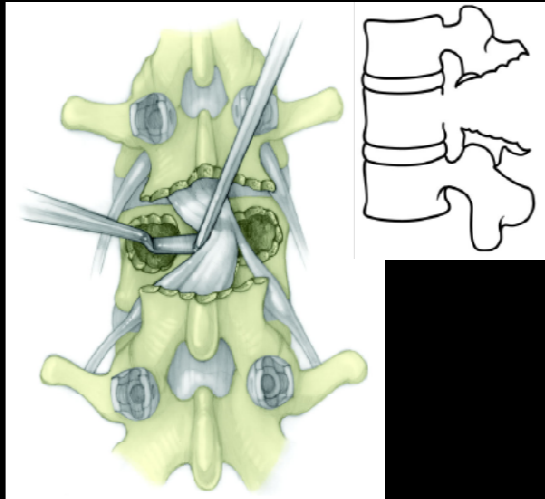


remove cancellous  
bone from the  
vertebral body  
creating a vertebral  
wedge

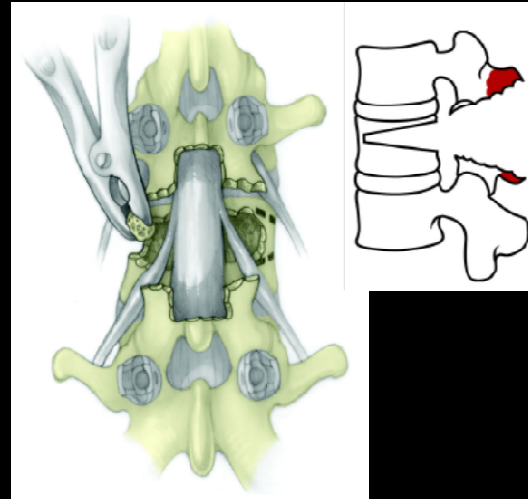


resection of the  
pedicles  
thinning of the  
posterior vertebral  
wall from within the  
vertebral body

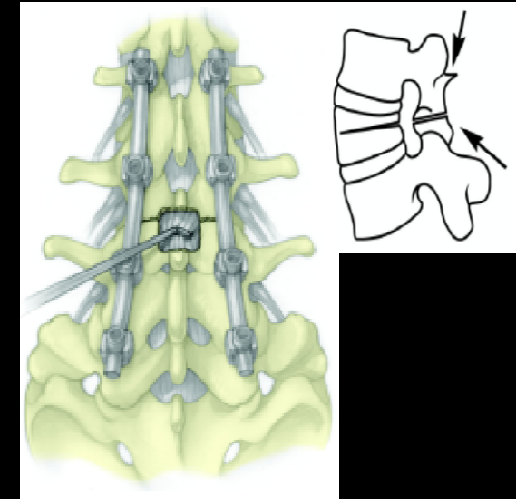
# Technique of PSO



pushing the bone of the posterior cortex into the vertebral body

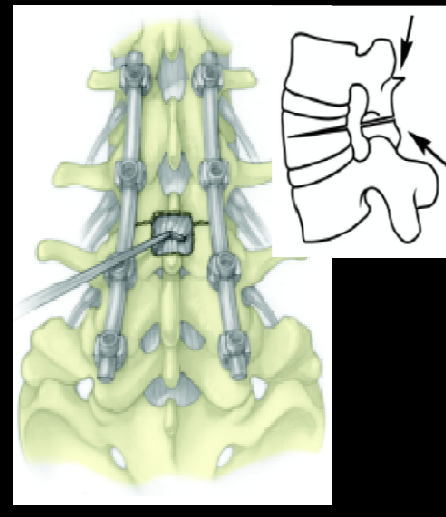
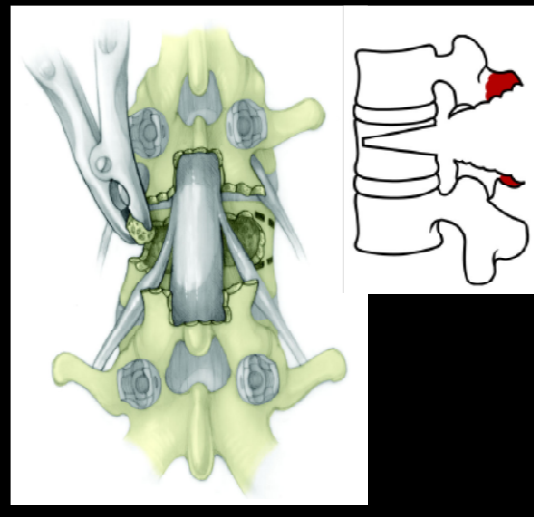
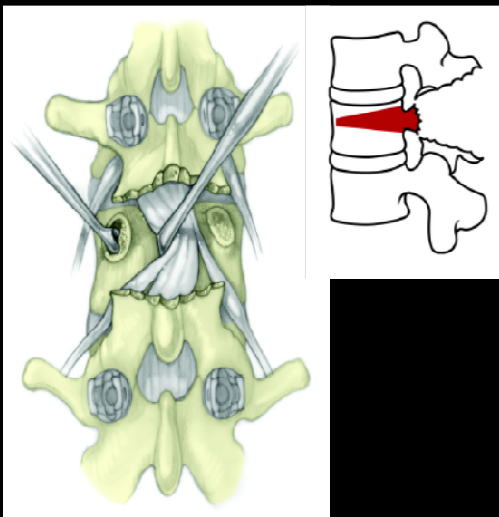
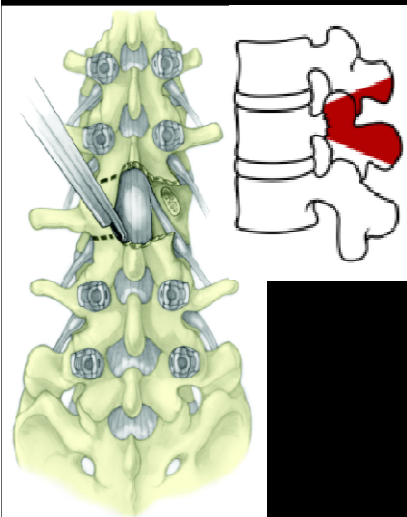
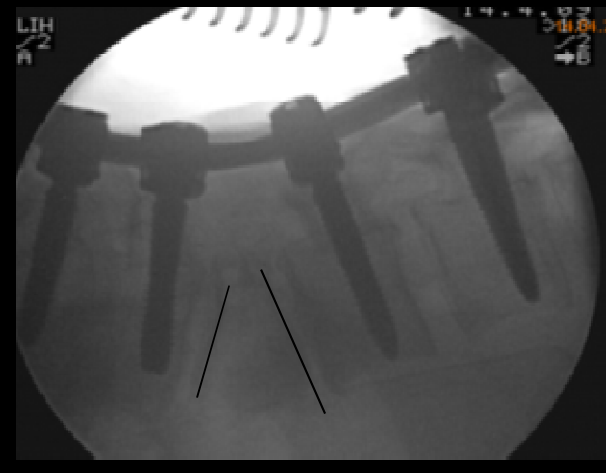
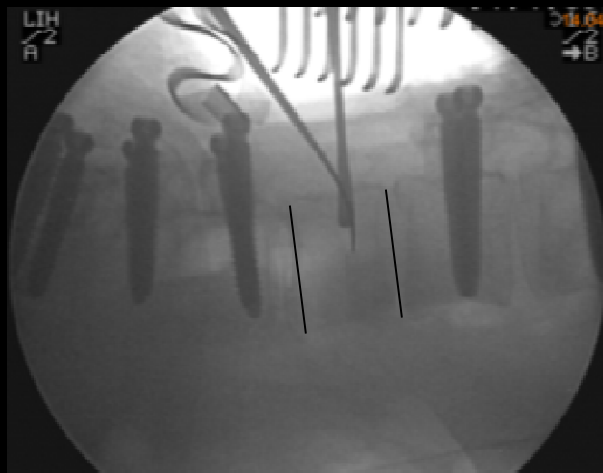
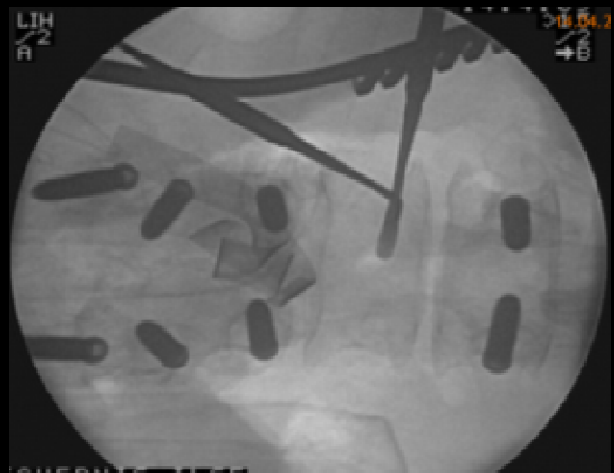


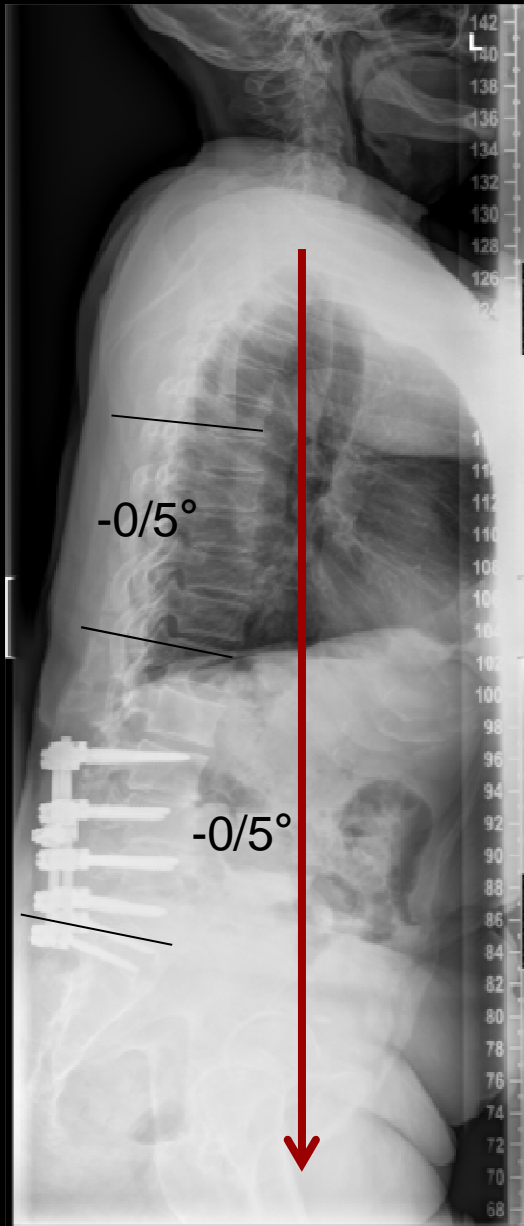
resection of the lateral borders of the vertebral body



closure of the osteotomy  
the anterior cortex is preserved to act as a hinge and to avoid translation

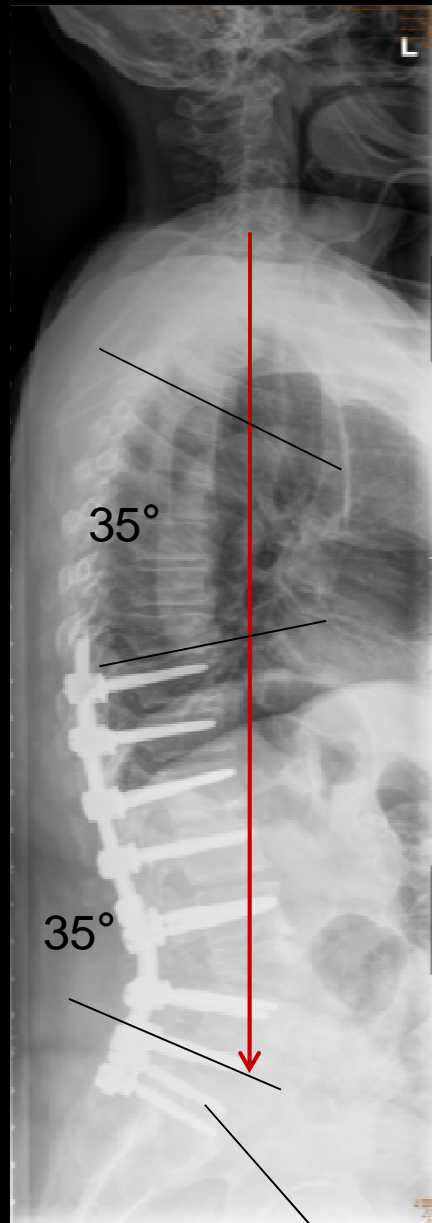
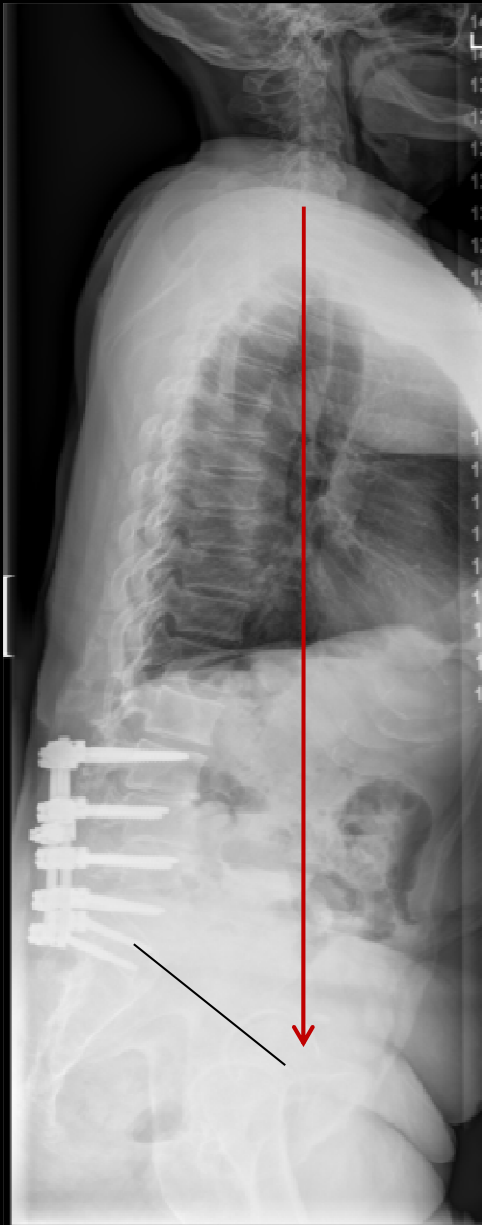




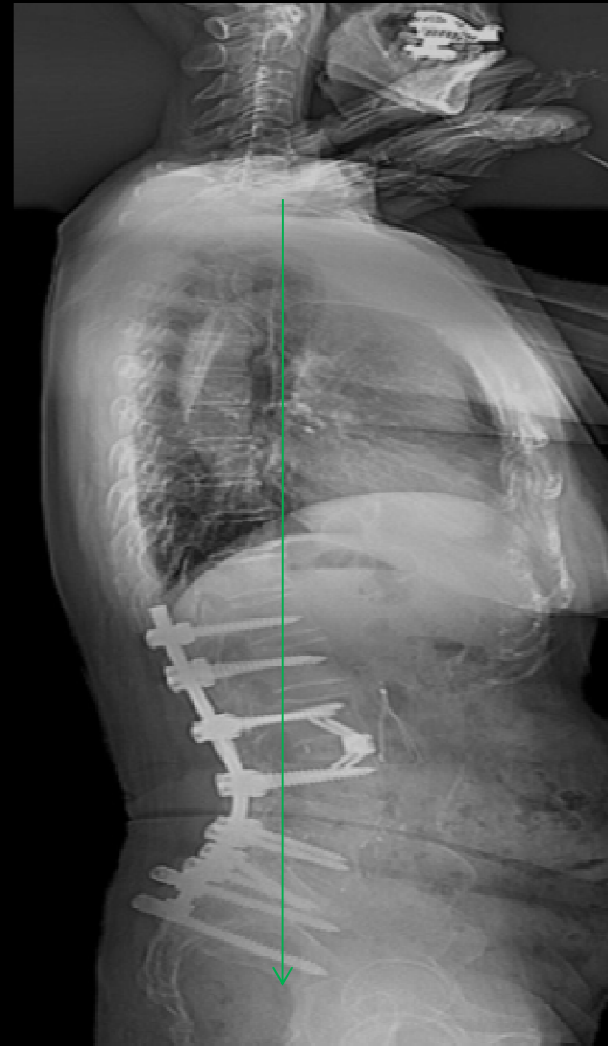
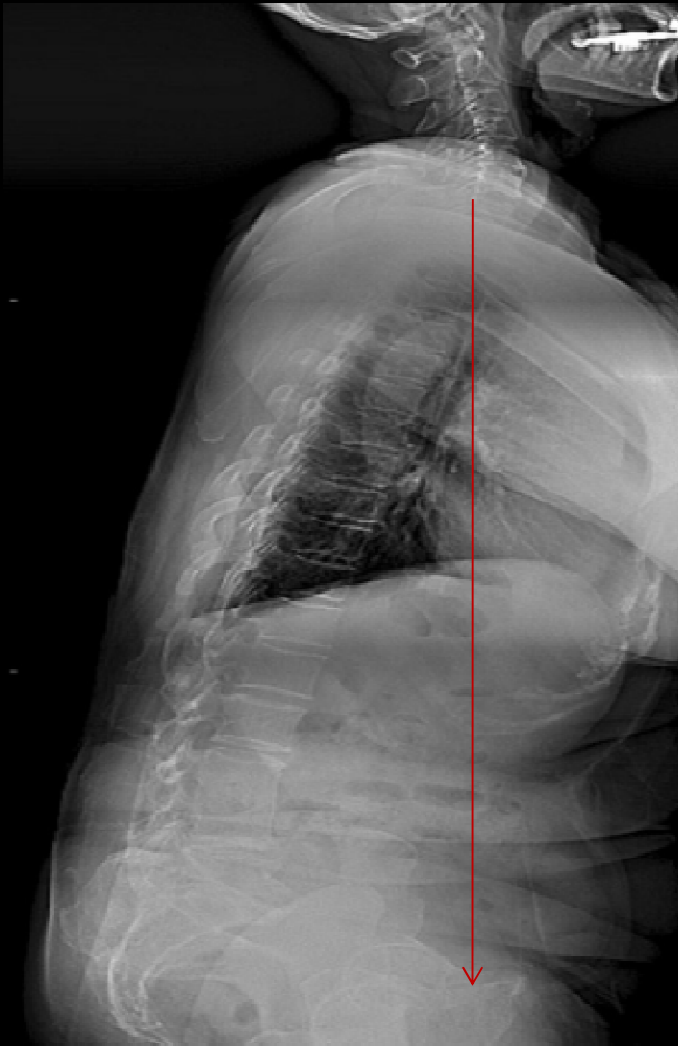


- C7 Lot ventral der BS L5/S1
- Verlust von lumbaler Lordose und thorakaler Kyphose

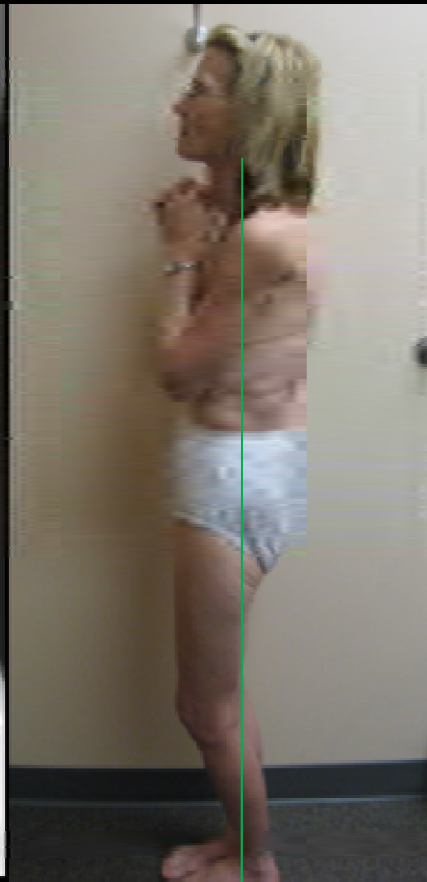
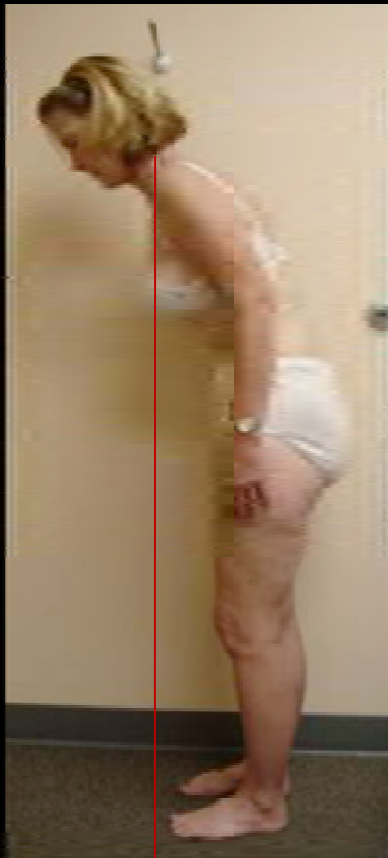
# PSO at L3



# PSO at L4



# PSO at L3

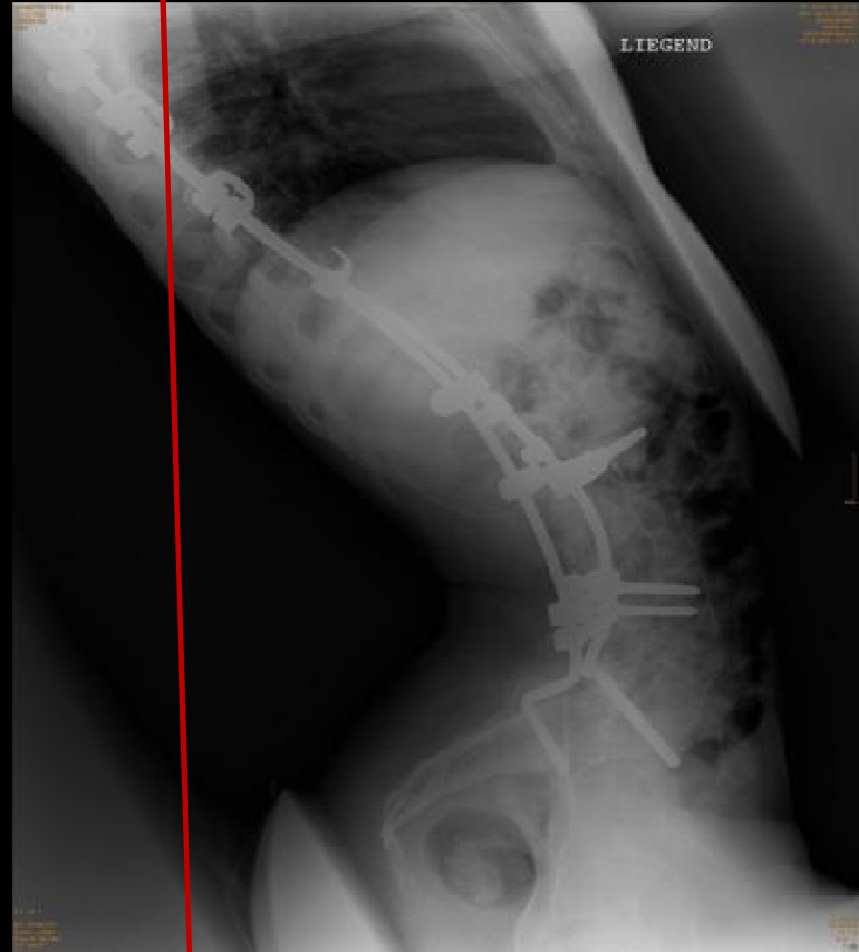
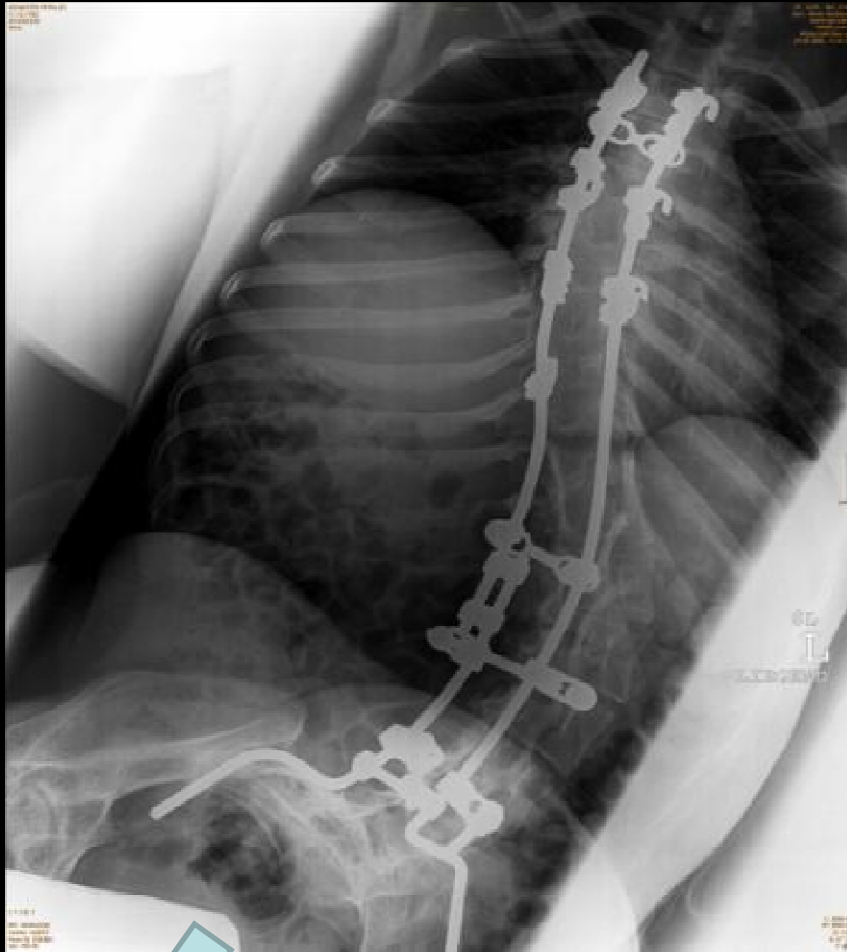


# thoracic PSO at Th9



VCR

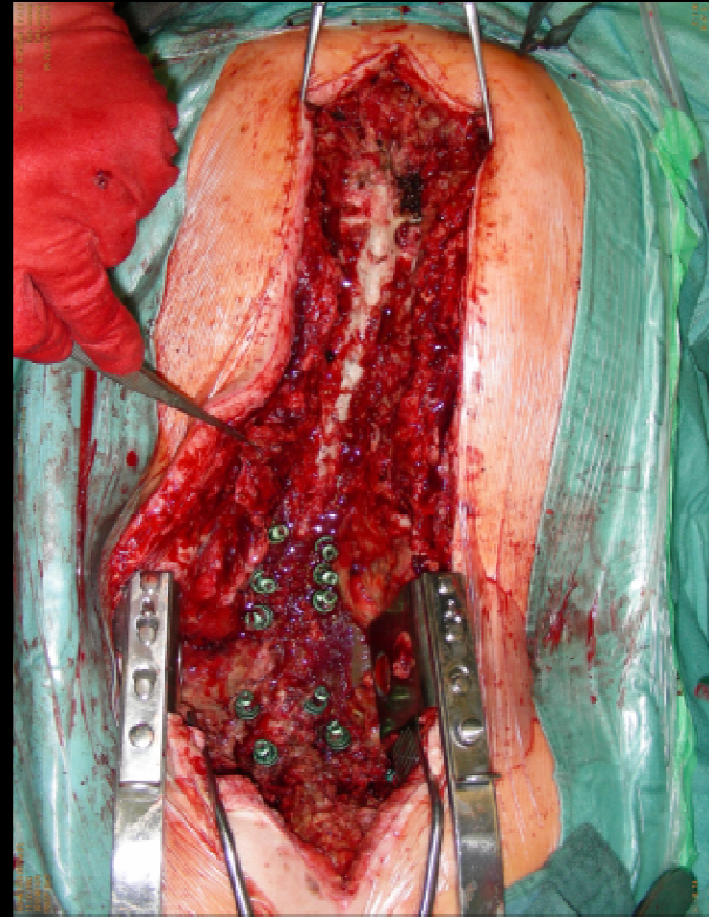
1995: posterior instrumentation,  
negative decompensation of sagittal balance



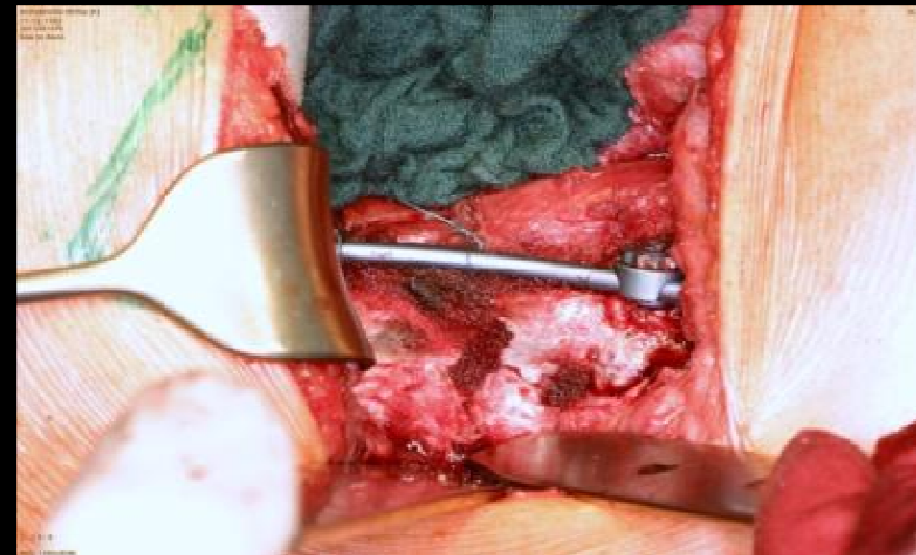
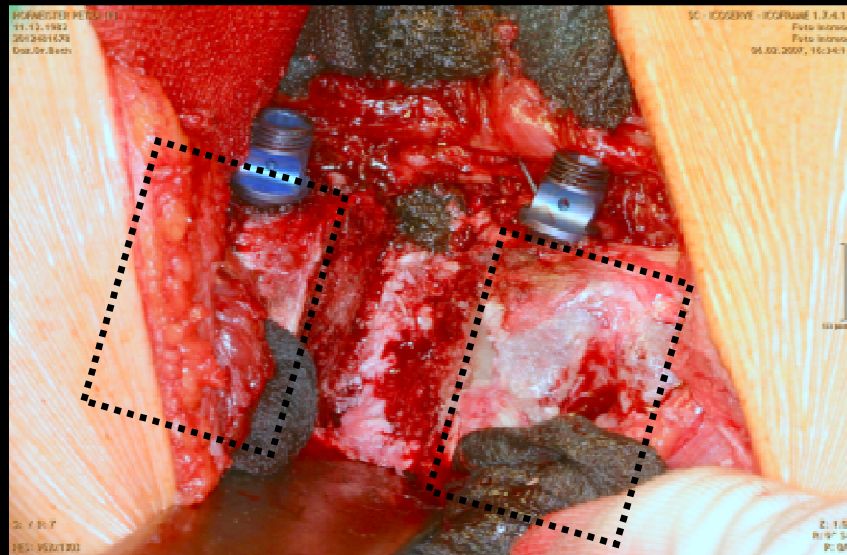
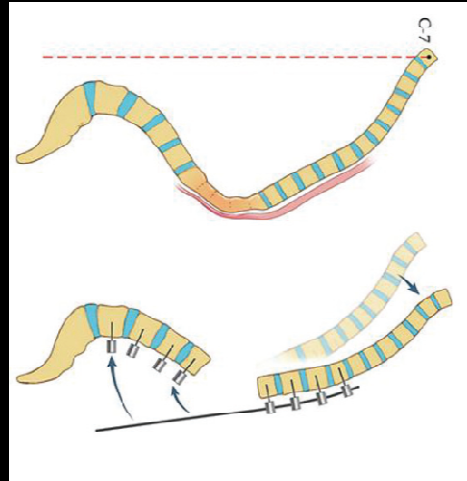
Sagittal profile !



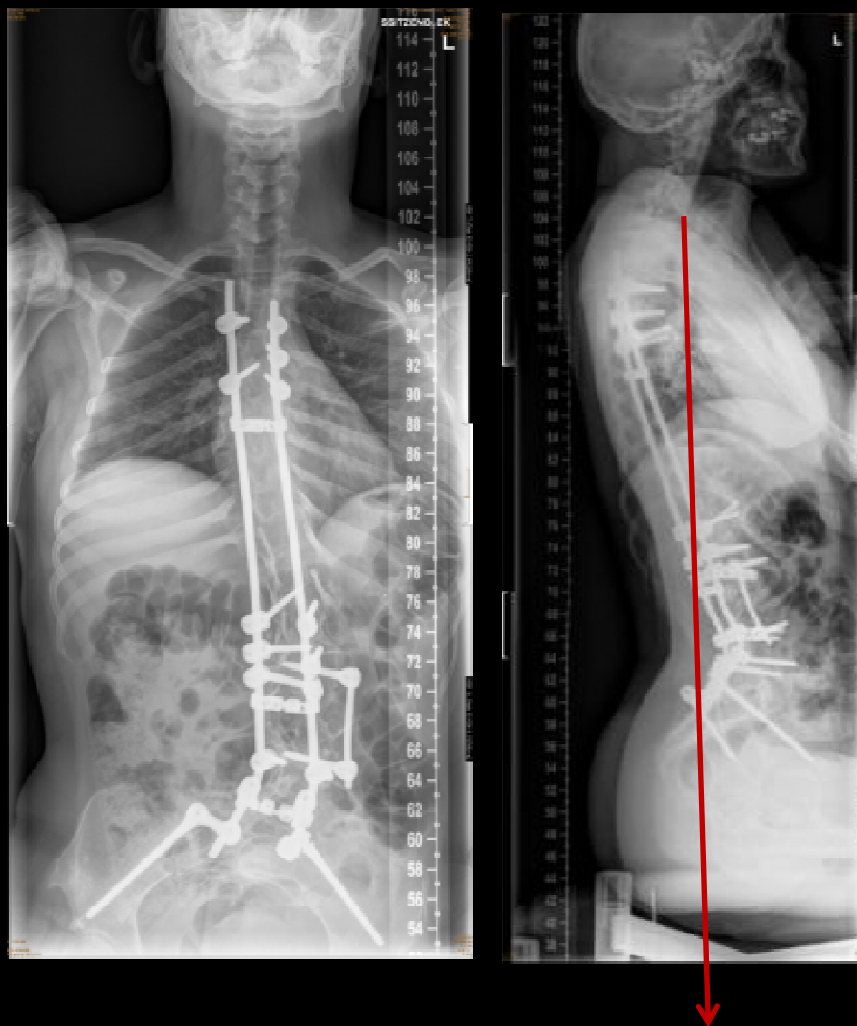
# Removal of hardware, reinstrumentation, posterior osteotomy



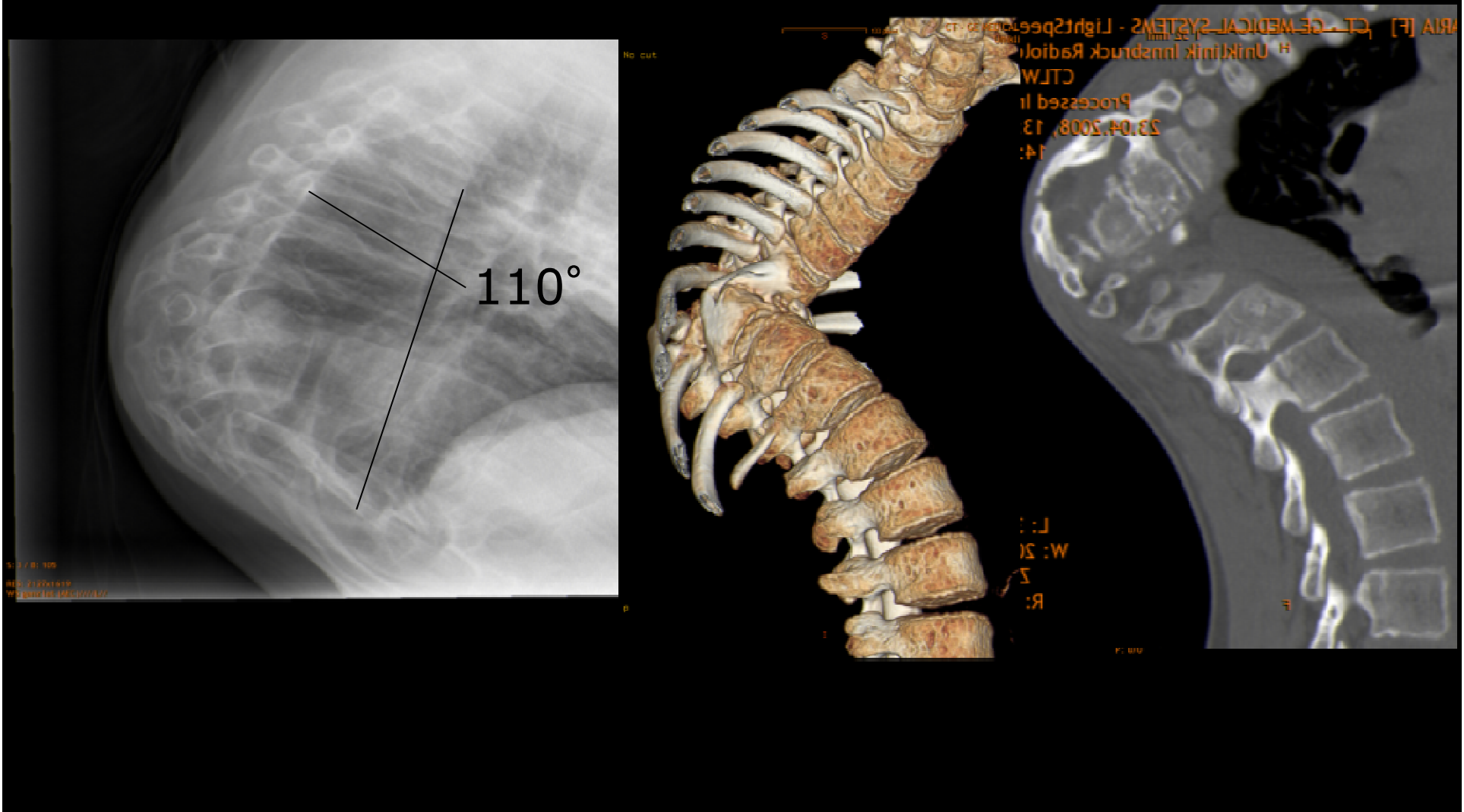
# Anterior osteotomy: vertebral column resection



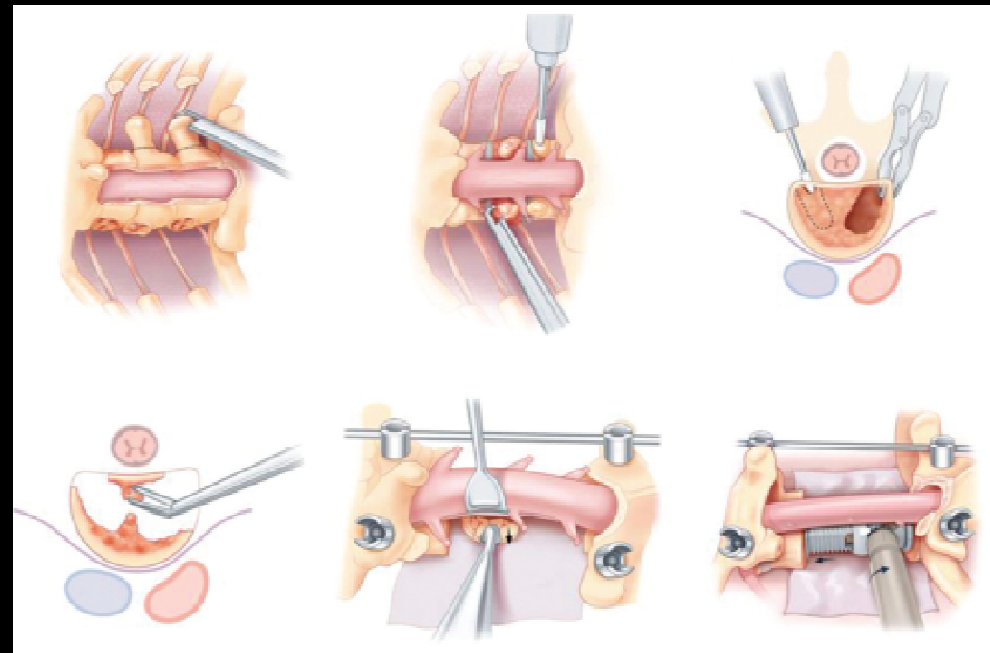
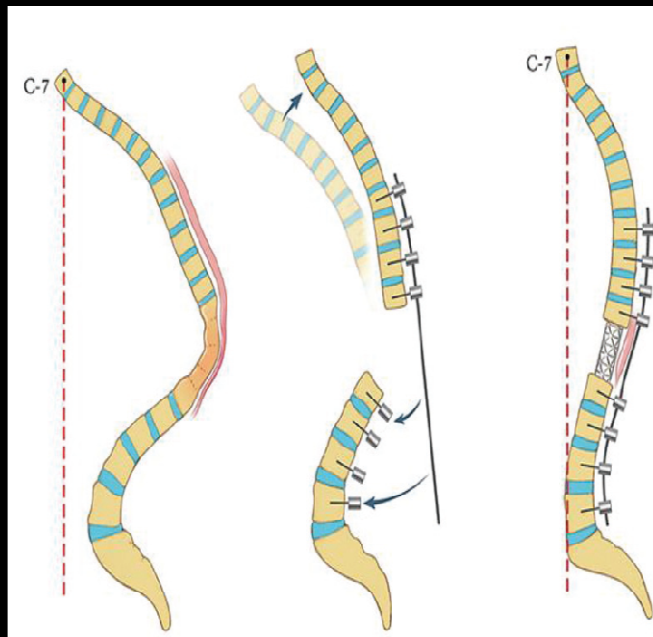
# Posterior instrumentation



# iatrogen thoracic hyperkyphosis



# VCR – vertebral column resection

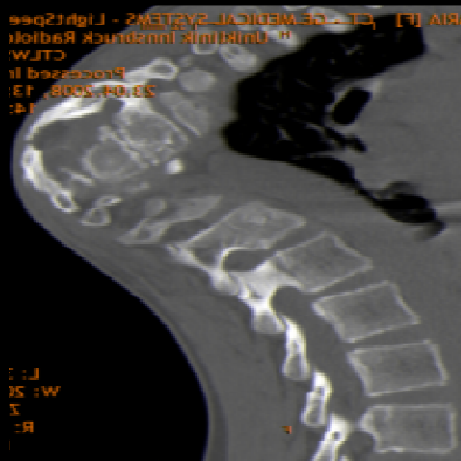


360° release: removal all posterior and anterior bony structures by an posterior approach (costotransversectomy)  
anterior grafting (Hypomochlion)  
Posterior compression, step by step posterior shortening leading to gradual reduction under Spinal Cord Monitoring

# Konklusion

## Kyphosebehandlung

Sehr variable Indikation, abhängig von der Ursache



# Konservative Behandlung: Korsett

- meist nicht effektiv  
NUR
- bei flexiblen Kyphosen
- bei Restwachstumspotential
- postoperativ



# Operation

M. Scheuermann: bei  $> 70^\circ$  und  
Schmerzsymptomatik

kongenitale Kyphosen: frühzeitig bei  
Progression

iatrogen (Laminektomiekyphose bei  
Tumor, Bestrahlung, Postentzündlich,  
Posttraumatisch): sofort





# Operation: *flat back syndrome*

RKO WZ 1B, Wirbel



## Prevention of sagittal imbalance

- Check sagittal balance preoperatively
- Restore or maintain sagittal balance in primary surgery

## Treatment of sagittal imbalance

- Use anterior grafting and/or posterior osteotomies in mild cases of sagittal decompensation
- Use PSO or VCR in cases of severe sagittal decompensation

# DANKE...

Innsbruck



Köln

