

Congenital deformity of the spine-therapy

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Conservative therapy

- in clear cases of progression (2 hemi vertebrae, unilateral bar etc. no waiting!)
- watching and control
- brace therapy only in cases of compensatory curves, very infrequent indicated!

Operative therapy-general rules

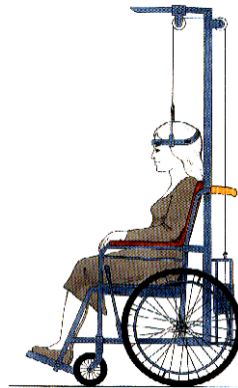
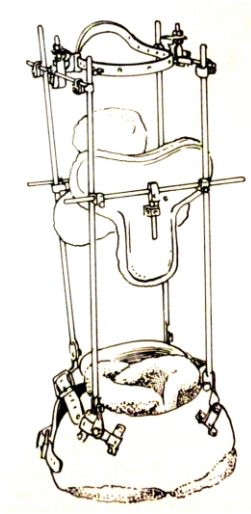
- better a short and straight than a long and curved spine
- at optimal time in most cases small operations are sufficient; in late cases frequently long operations with high complication risk are necessary
- **waiting up to the end of growth in progressive congenital deformities is a severe mistake!**

Preoperative therapy

- in case of severe deformity, especially with severely reduced lung function Halo-extension (Halo-gravity, Halo-wheelchair, Halo-pelvic)
- exact neurologic examination during Halo-extension:
- **eye muscles** – looking at moving finger
- **n. facialis** – closing eyes, showing the teeth
- **n. accessorius** – lifting of shoulders
- **n. hypoglossus** – showing the tongue, speech!
- motor and sensoric testing of upper and lower extremities
- **pyramid signs** - Babinsky, abdominal reflex

Severe complications in Halo-Pelvic-extension

- peritonitis by perforation of iliac screws
- cervical problems > 50%, degenerations of cervical spine, avascular necrosis of dens, spontaneous fusion (Dove et al. 1980)



Halo-wheelchair-extension

Complications of Halo-ring

- pin-infection – change of screw position, oral antibiotics
- pin-loosening
- nerve irritation (n.supraorbitalis)
- intracerebral pin penetration-bleeding, pneumocephalus, brain abscess..

Halo-extension is contraindicated in rigid kyphosis apex-by extension of the proximal and distal spine in a rigid apex the myelon can be bent over the apex with following paraplegia!

Operation techniques for congenital scoliosis

- posterior fusion in situ
- instrumented spondylodesis
- convex hemiepiphysodesis
- resection of half vertebra (anterior and posterior)
- instrumented correction and fusion
- VEPTR (vertical expandible prosthetic vertebra rib)
- combined operations

Fusion in situ

- in segmentation defects (unilateral bar)
- in fully segmented hemi vertebrae (as soon as diagnosis is clear!)
- use of implants is recommended already in toddlers
- posterior fusion alone mainly in kyphotic deformities
- additional anterior fusion depends on the quality of disks-cave Crankshaft-phenomenon, mainly in lordotic deformities!

Convexsided hemiepiphysodesis

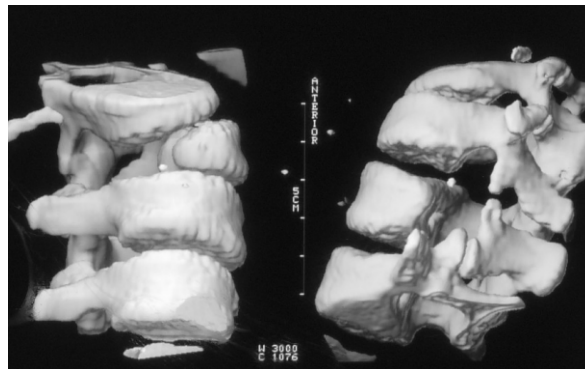
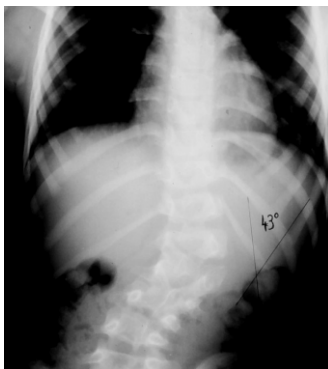
- in cases of expected growth at the concave side (hemi vertebra)
- optimal in children <5 years
- correction av. <15°
- anterior and posterior approach
- anterior: disc resection cranial and caudal of hemivertebra only to midline with bone grafting
- posterior only approach with use of pedicle screws to obtain anterior growth arrest by transpedicular convexsided disc resection and bone transplantation

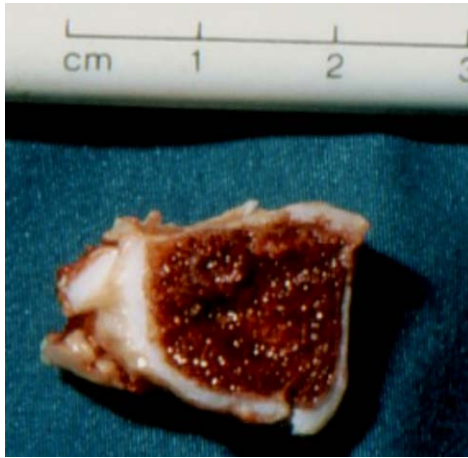
Resection of half-vertebra

anterior-posterior-in lateral decubitus position, fixation by hooks or pedicle screws

posterior approach alone-blood loss and complication risk higher!

posterior : in cases with good flexibility and relatively normal segmentation





half vertebra resection



Correction and instrumented fusion

- anterior-posterior:** 1) in cases of less mobility in bending films
2) at risk of Crankshaft

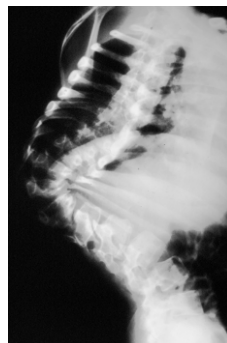
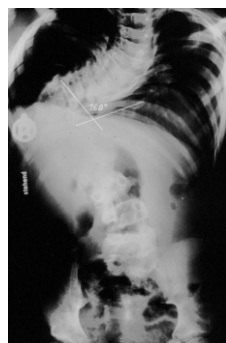
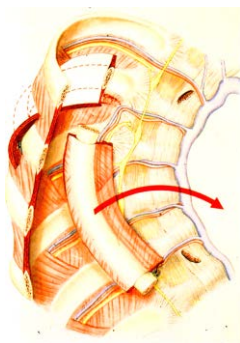
in combination with osteotomies- eventually with intermittent Halo traction (cave-no traction in rigid apex of kyphosis!)

as posterior correction alone by pedicle subtraction osteotomy

Anterior support in remaining kyphosis

Bradford-technique of vascularized rib graft

Preparation of elected rib under remaining intercostal muscles cranial and caudal;
Anterior ligation of intercostal vessels, posterior cautious deperiostation and cut of rib under care of vessels; preparation of intercostal artery and vein to the foramen, then creation of holes into the end-vertebral bodies of kyphosis and implantation of vascularized rib; osseous integration within of 2 months!



Nonon-fusion-techniques

Growing rods-subcutaneous or submuscular rods



VEPTR-vertical expandable prosthetic vertebral rib



Anterior approaches in congenital deformity

thoracotomy, thoracophrenolumbotomy Hodgson, double-thoracotomy Bauer, extreme lateral approach

Iliosacral fixation

Galveston technique (rods 6-8 cm into the iliac bone)



Iliac screws