Motion preservation for Growth Modulation

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Disclosure

- Paradigm Spine: consultant
- Spinevision: co-inventor of a spinal instrumentation: royalties

Why should we strive for Motion (and Growth) Preservation?

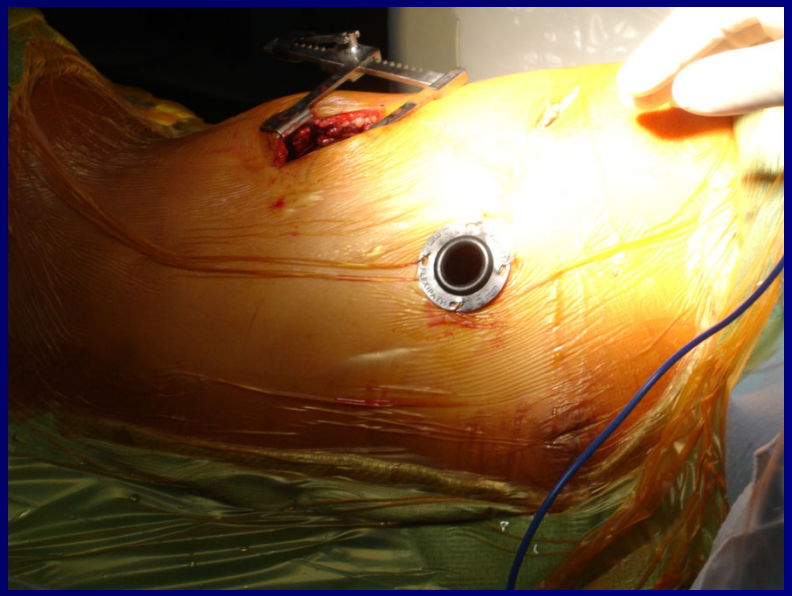
Early « In situ fusion » may lead to significant trunk shortening…

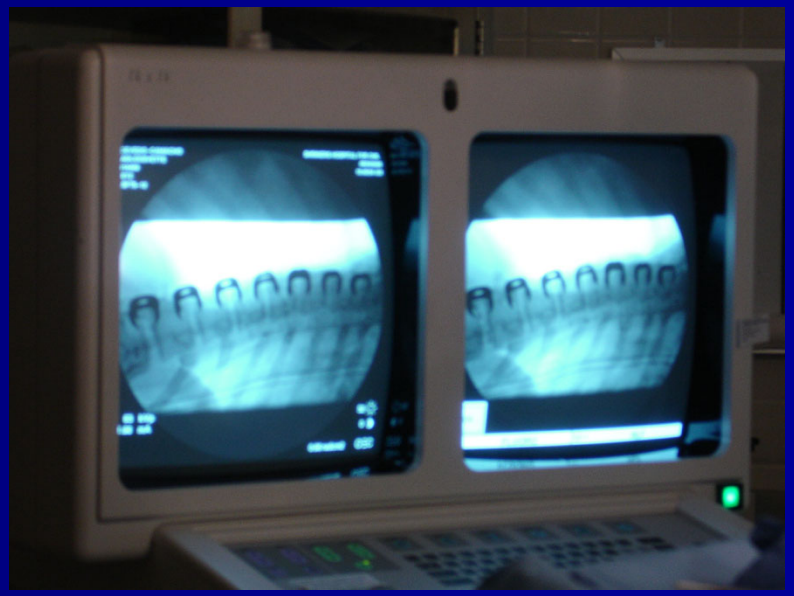
…and respiratory deficit!

Motion Preservation and Growth Modulation through?

- Tethering
  - Vertebral stapling
  - Short convex hemiepiphysiodesis
- Expansion (Distraction)
  - Through repeated surgery
    - Growing rods
    - VEPTR
  - Through motorized devices
- Future perspectives
  - Hydraulic motorized distraction

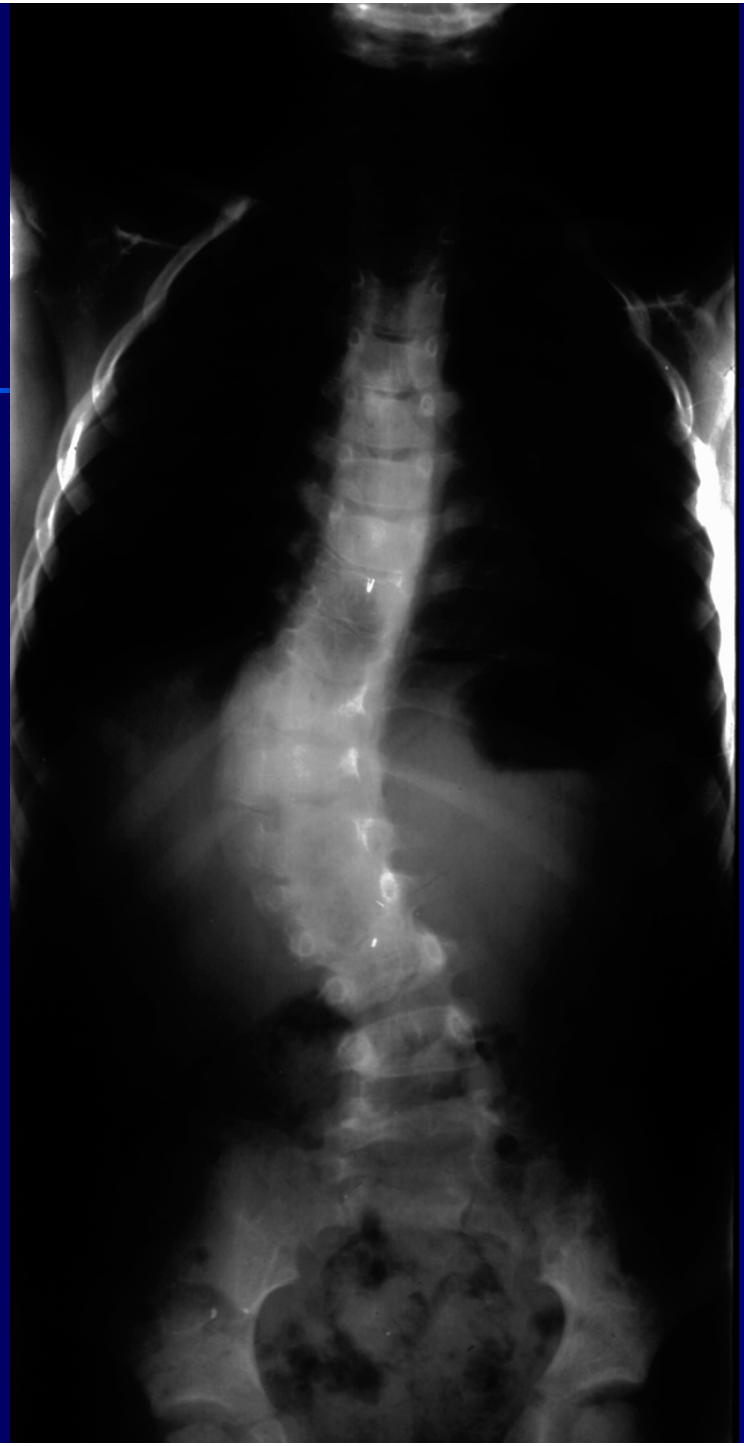
Vertebral Stapling?

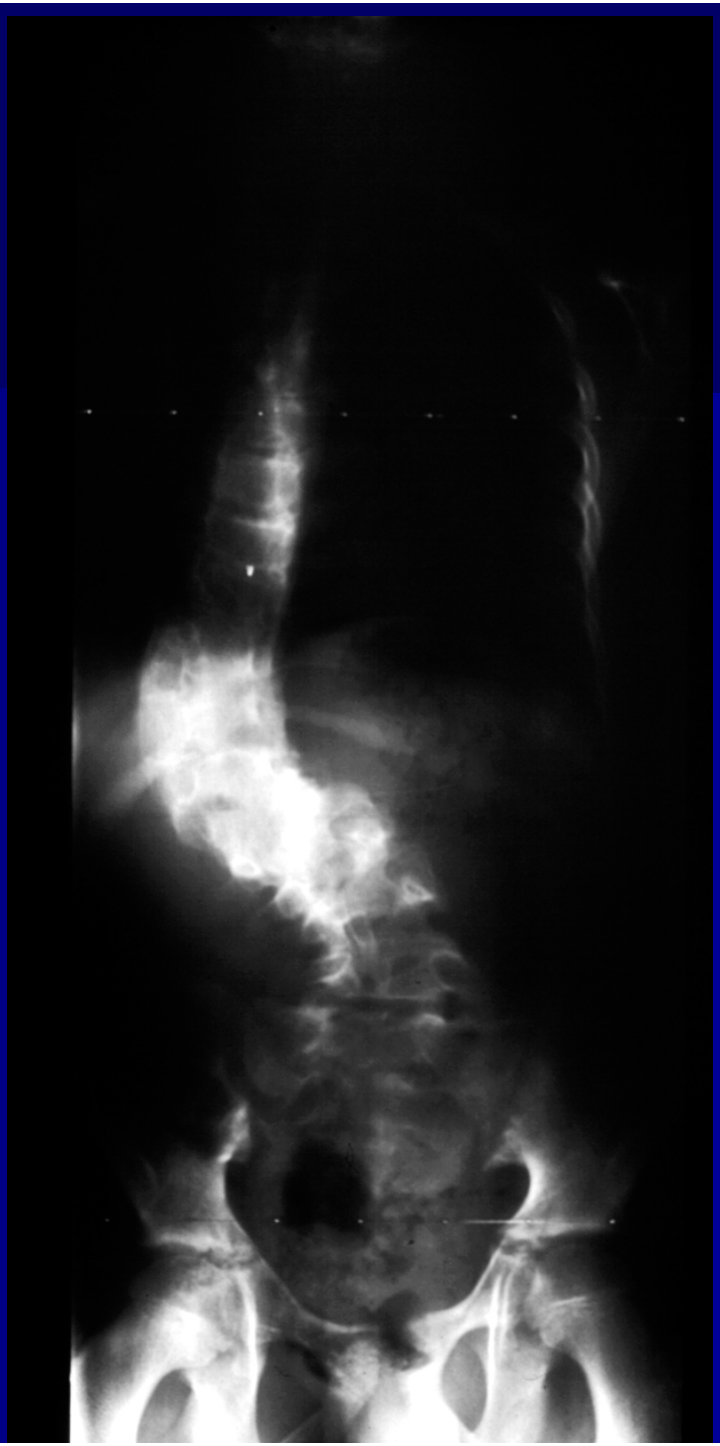


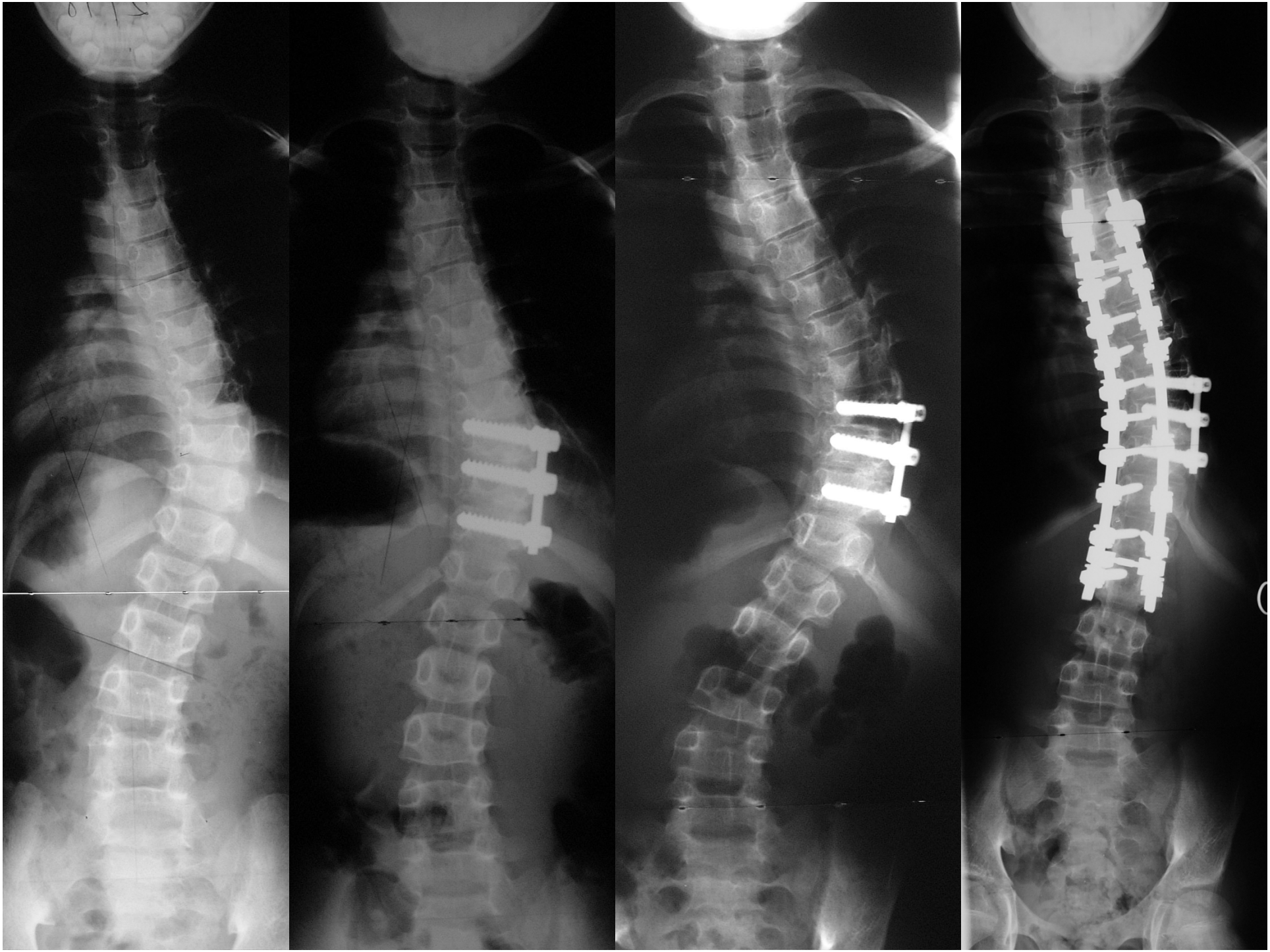


F/U needed

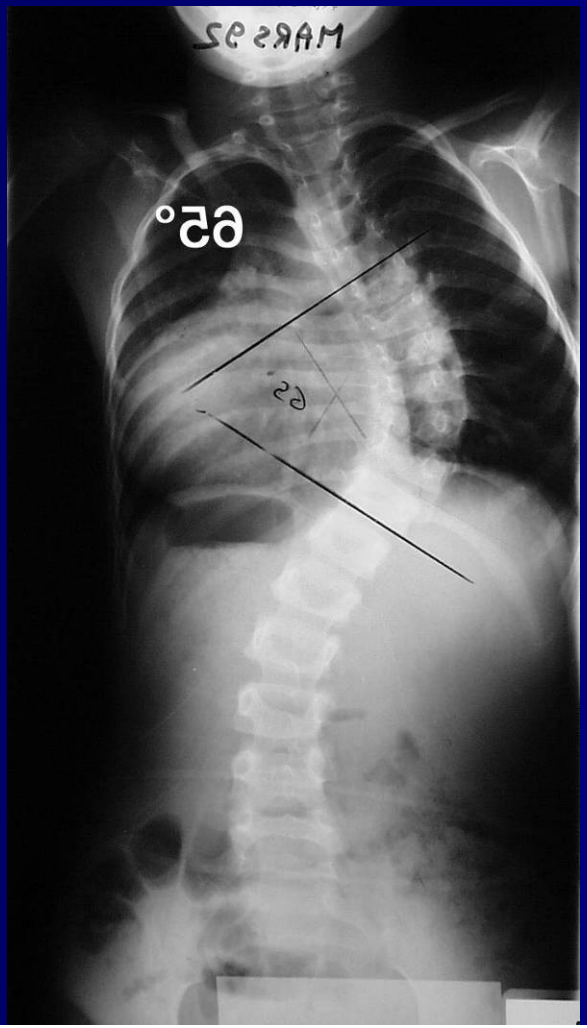
- Will we be able to restore motion once those staples are removed?
- Indications are limited
  - Not for aggressive scoliotic deformities
    - Hemiepiphysiodesis is not very efficient in those indications

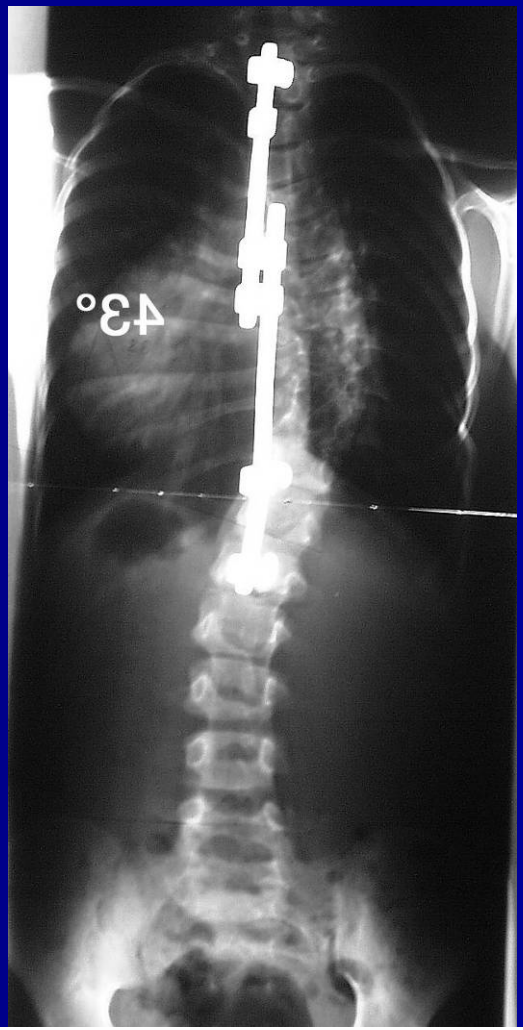




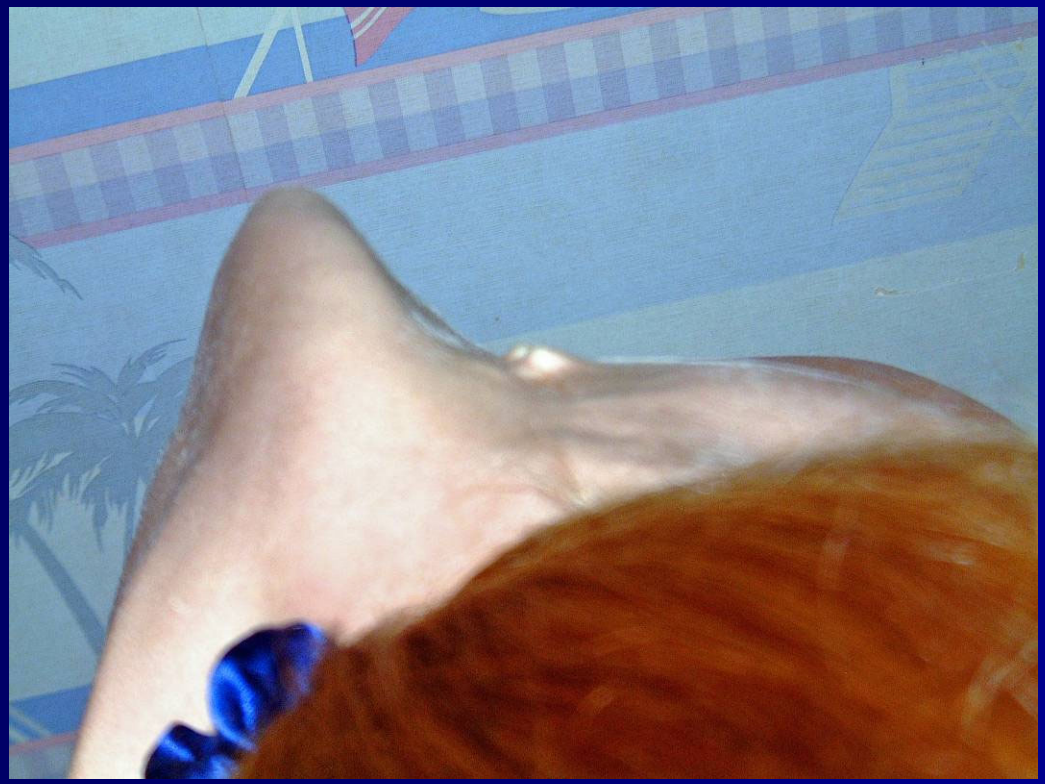


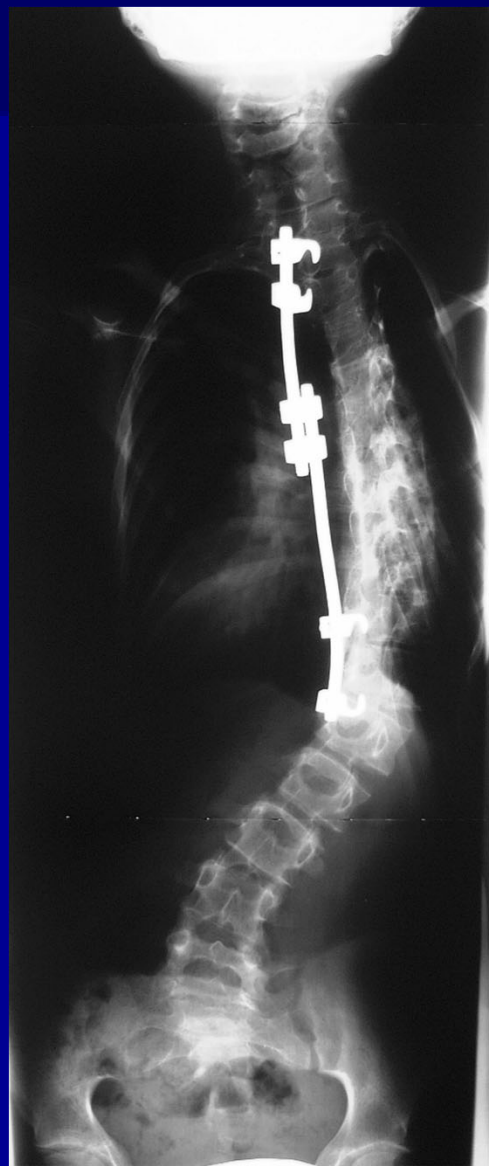
« growing rod » with anterior convex fusion



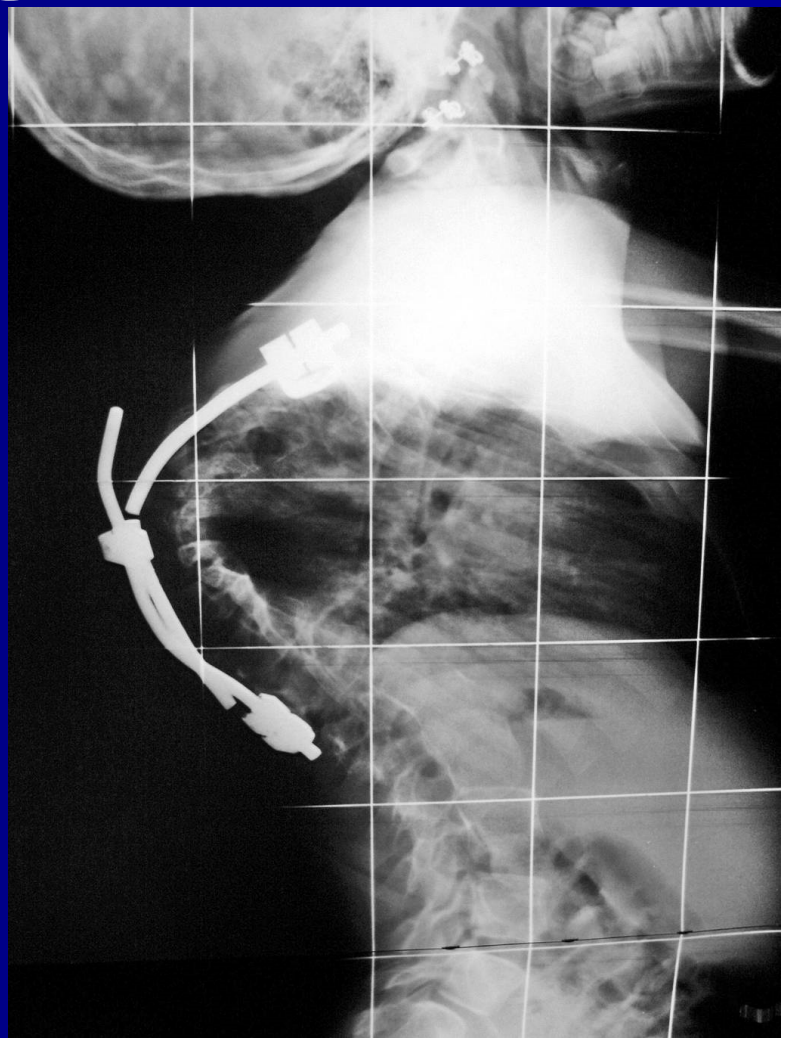


« Crankshaft » phenomenon and spontaneous posterior fusion



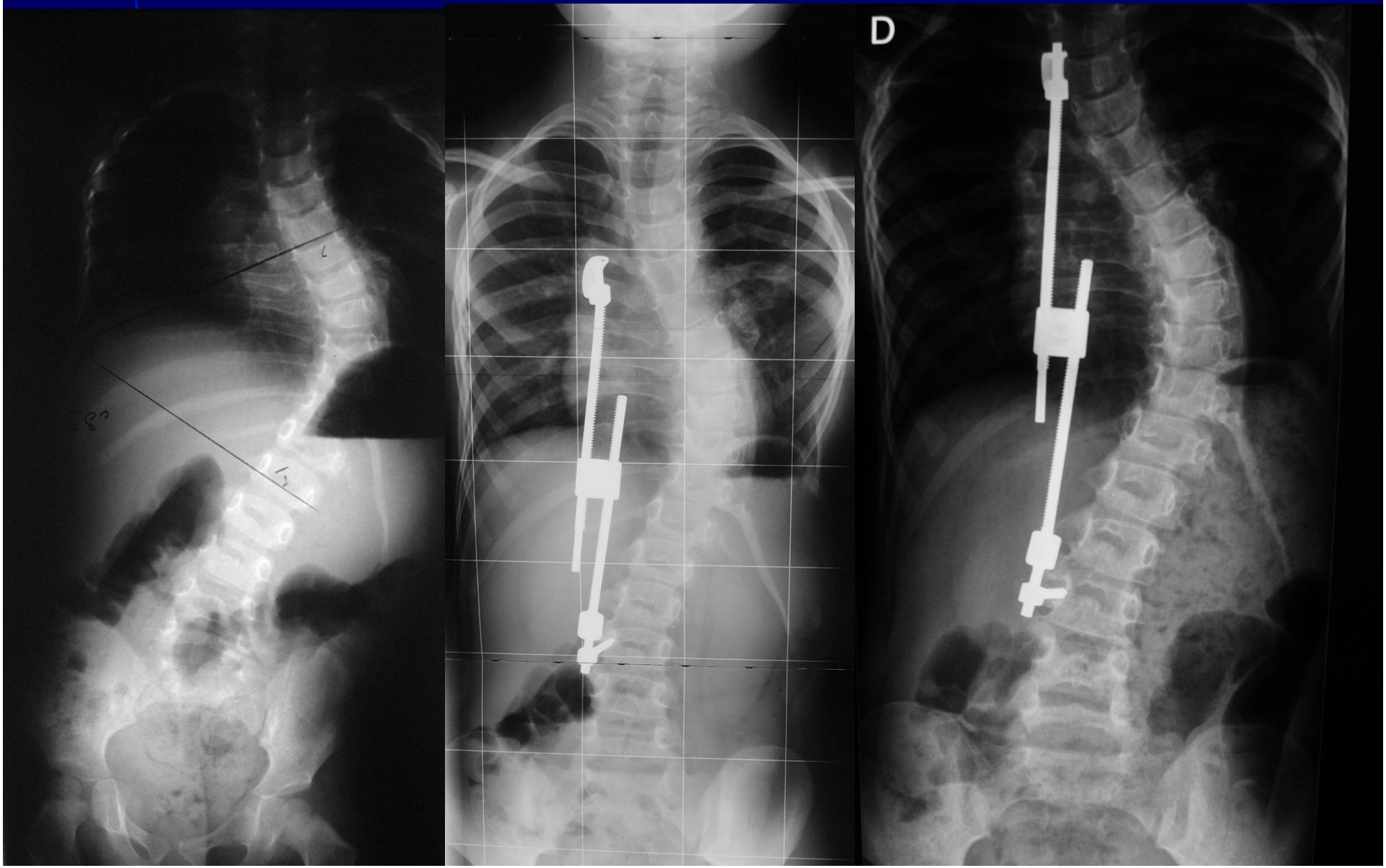


Rate of distraction? Beware of the posterior tethering effect!



Repeat distractions with a more flexible system?

Rib fixation?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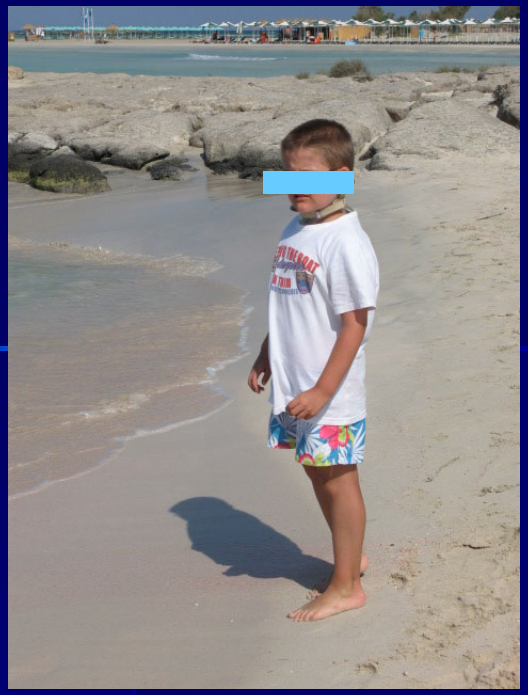
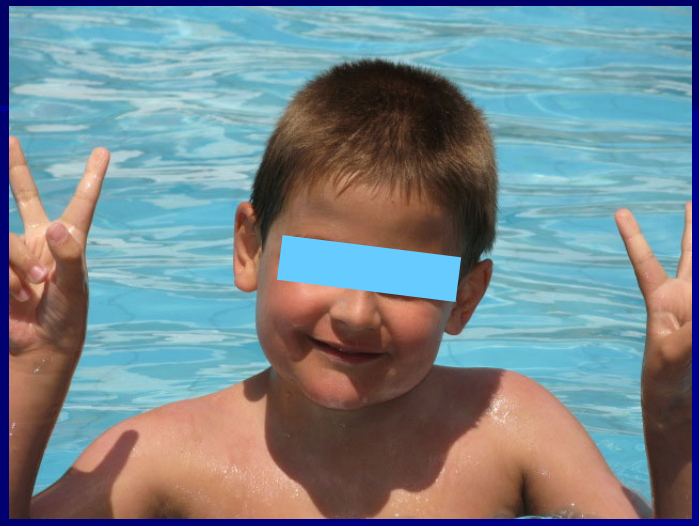
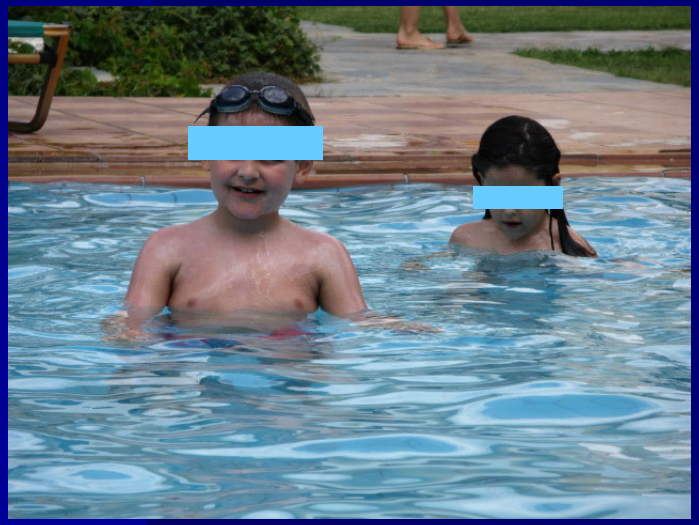
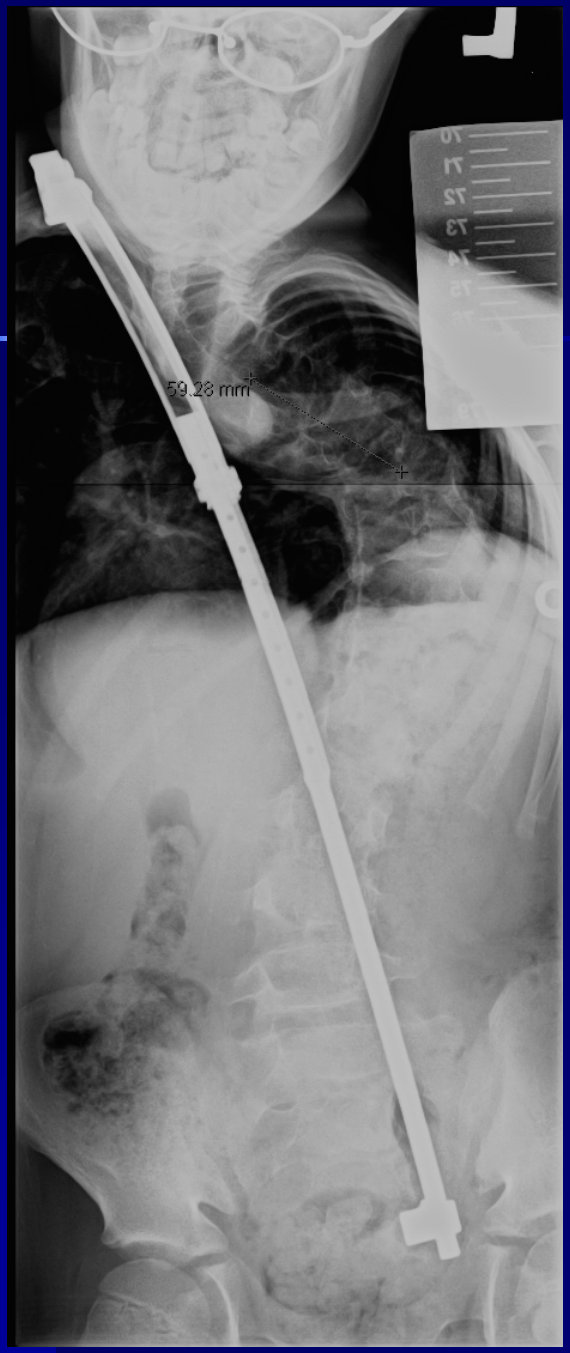


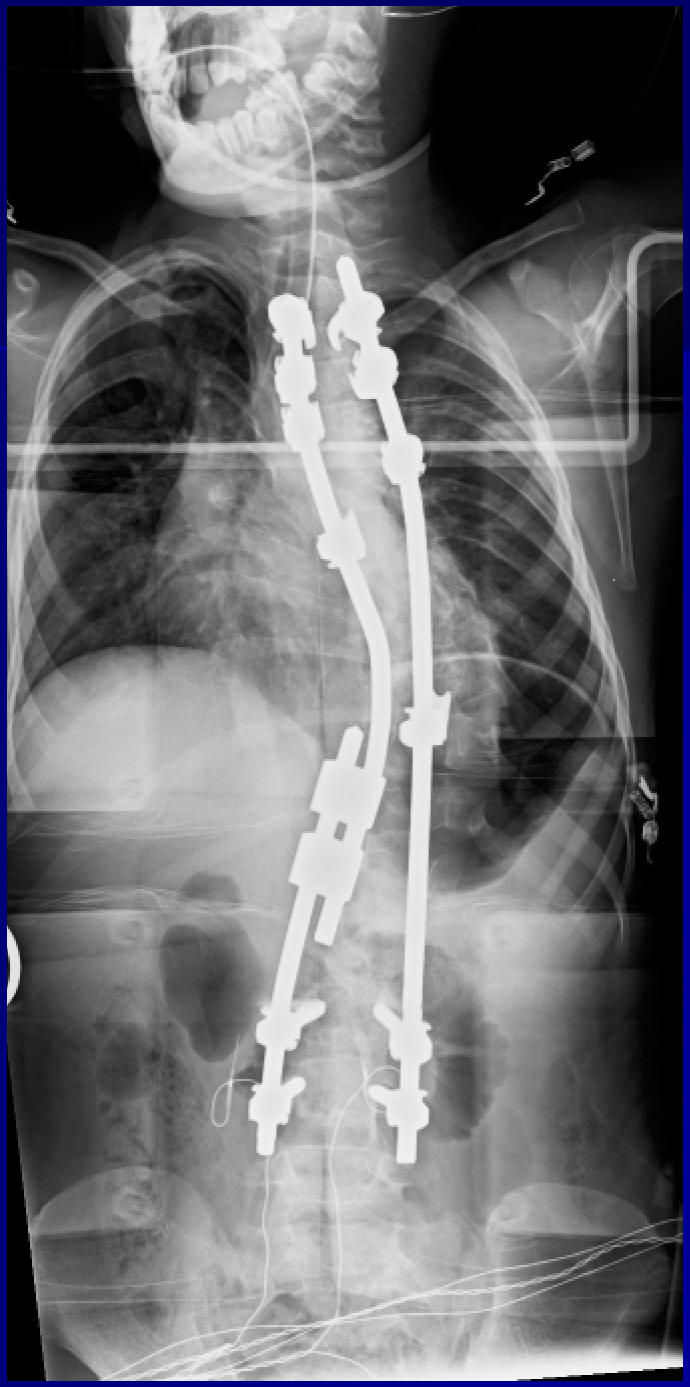




Will we be able to maintain those results up to the end of growth?

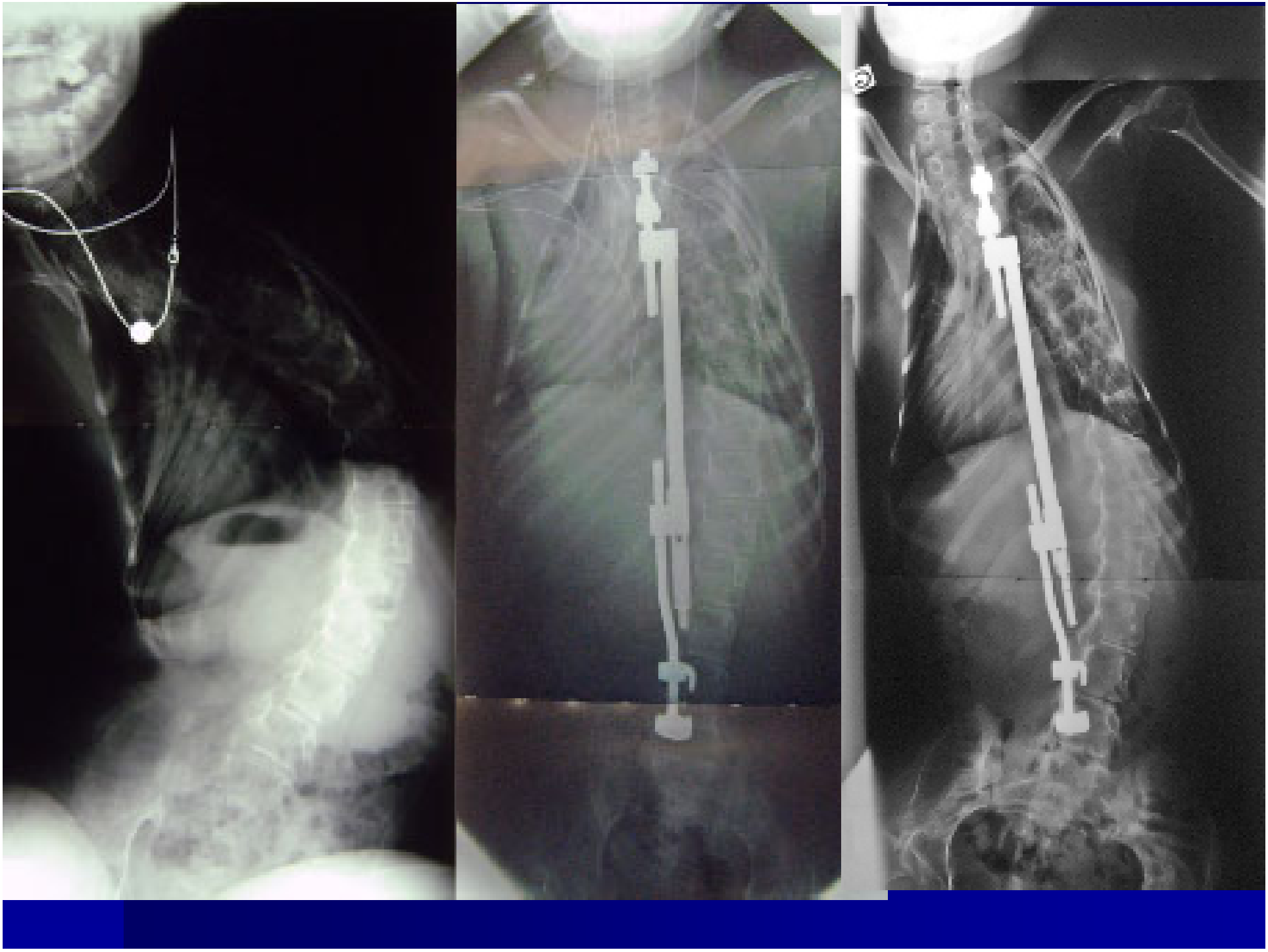
Decompensation during the growth spurt?


59.28 mm



Frequent distractions may help with preservation of the trunk shape during the growth spurt

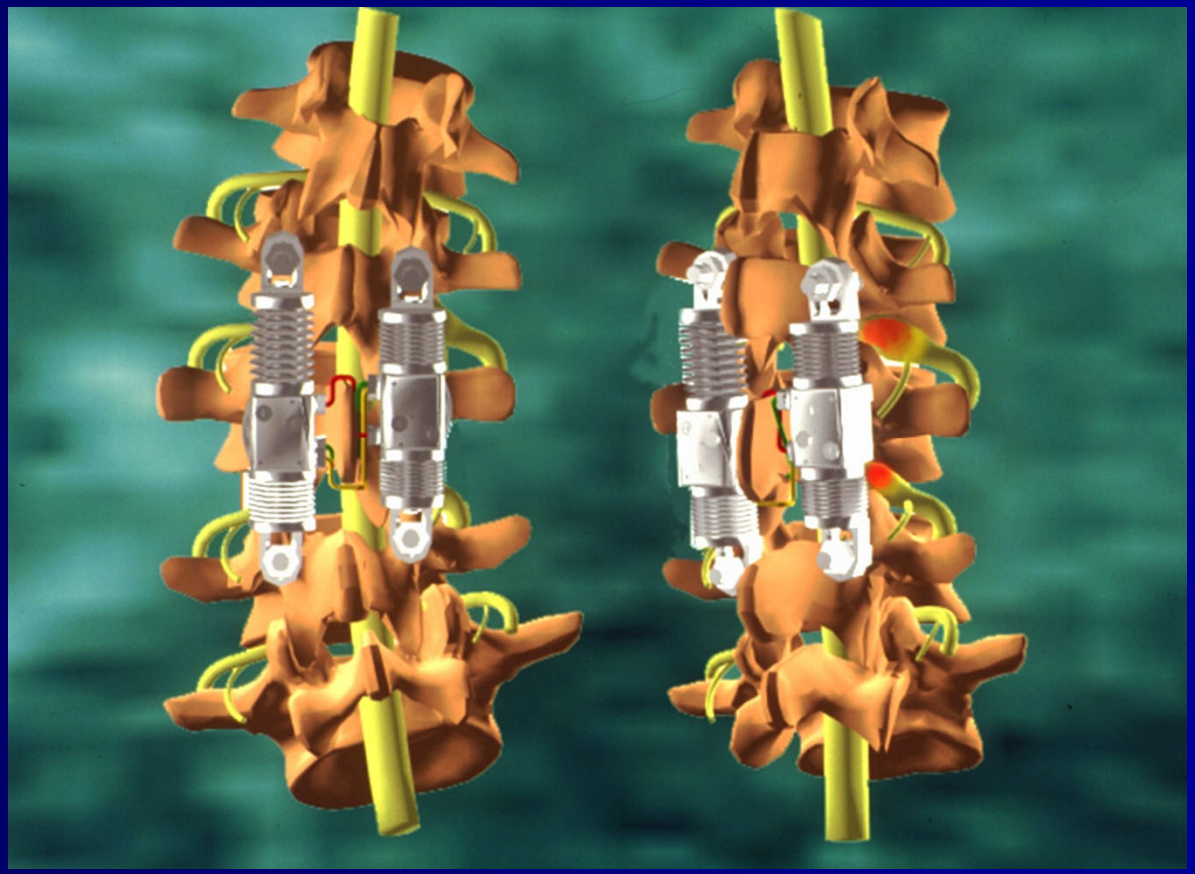
Motorized systems?



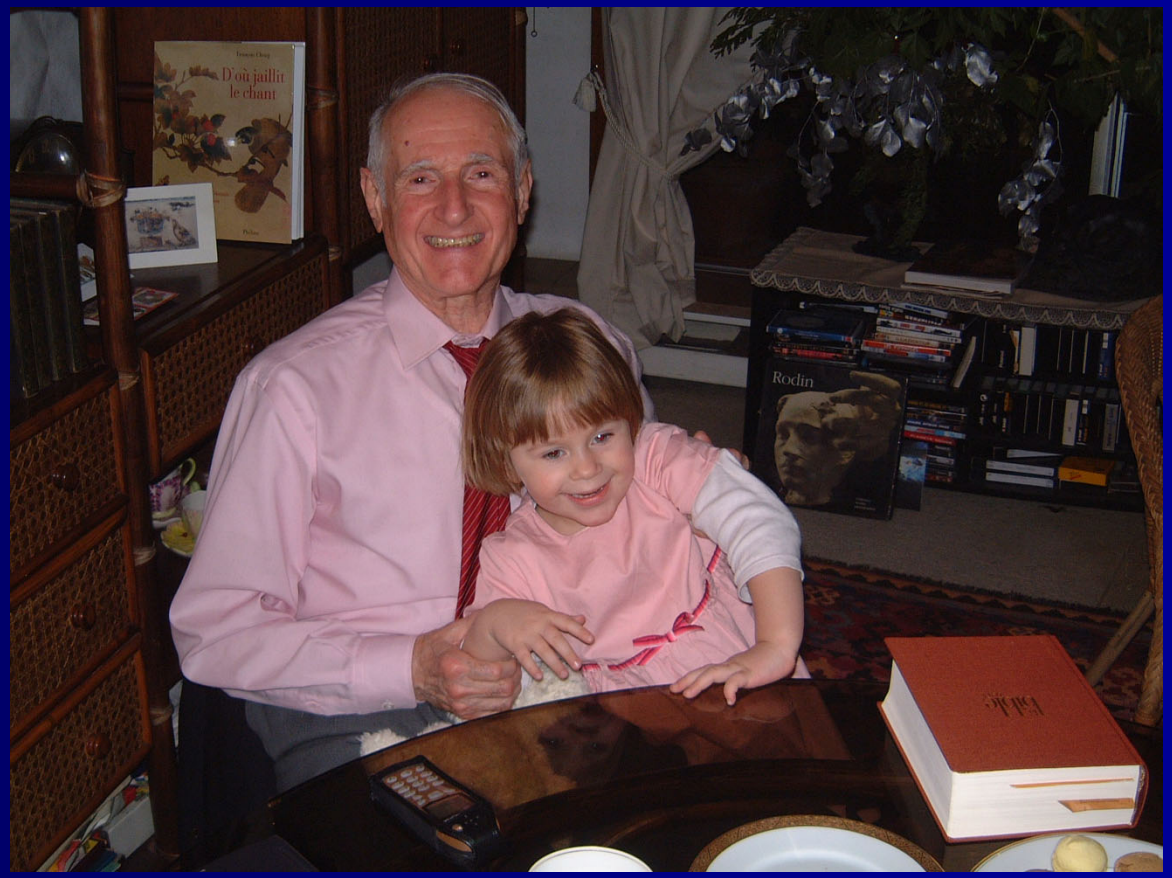
Encouraging results but

- How can we avoid loss of fixation at the level of the anchor points?
- How can we supply an efficient powersource over many years?

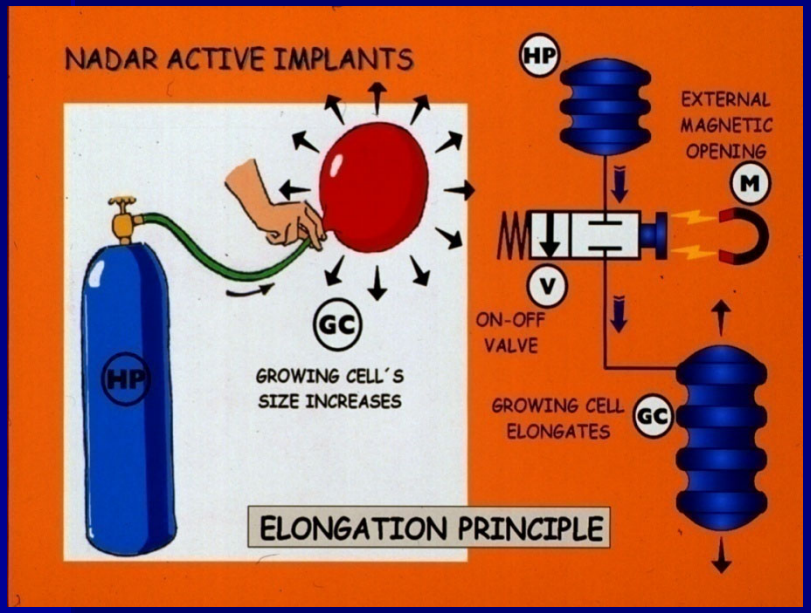
Motorized hydraulic system: NADAR

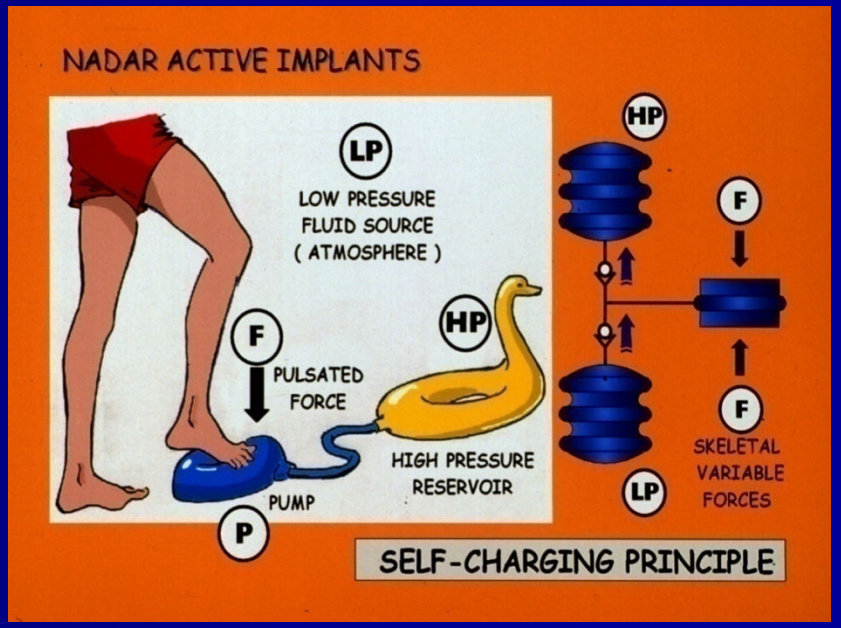


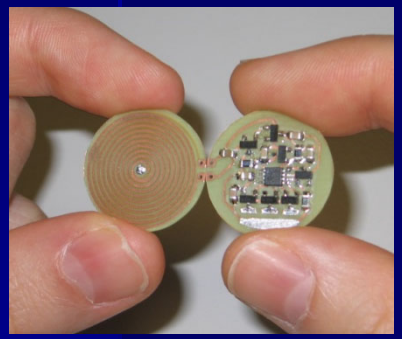
Fred Zacouto: Inventor of the artificial heart, co-inventor of the pacemaker

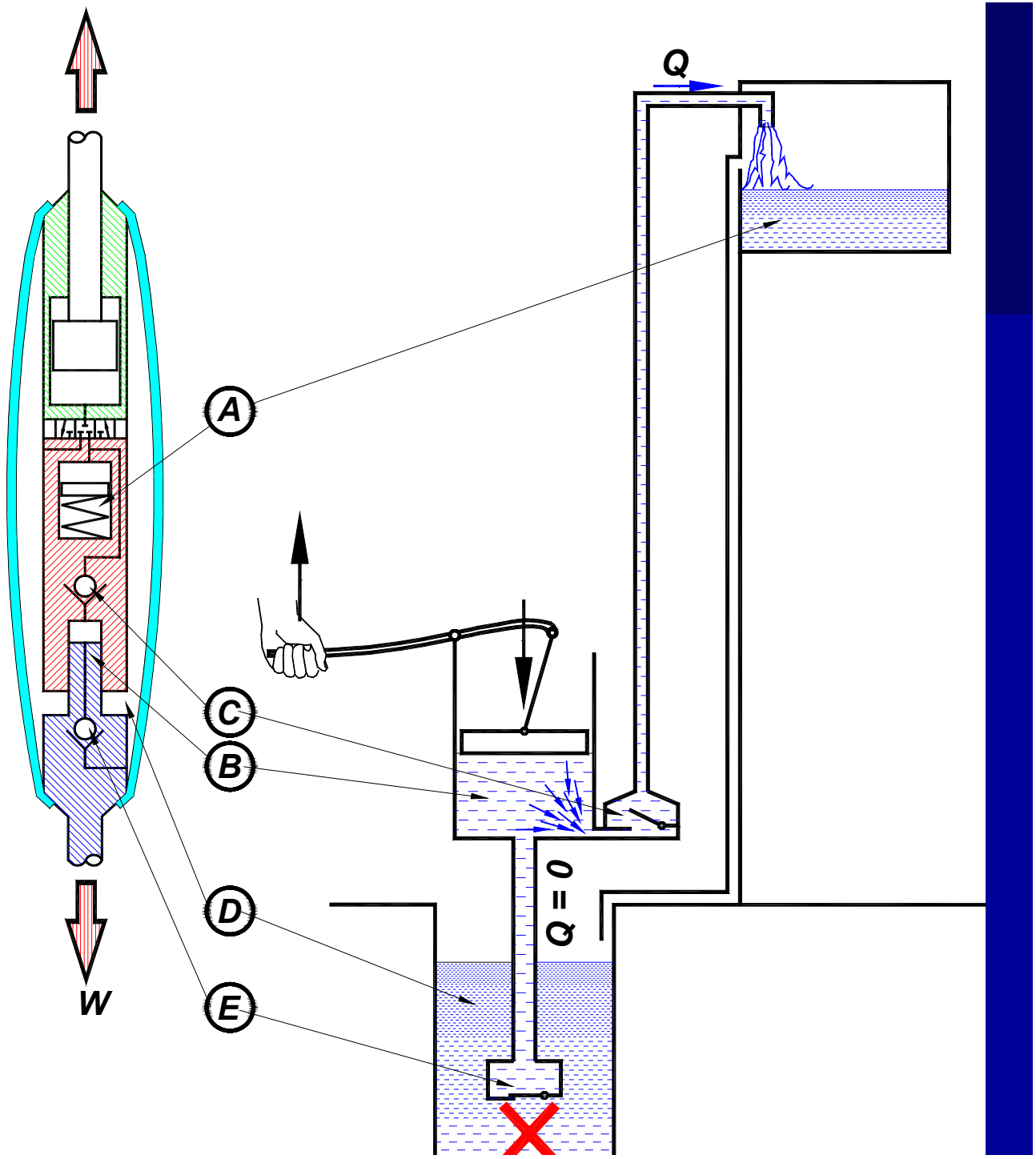


Power source: spinal mouvement



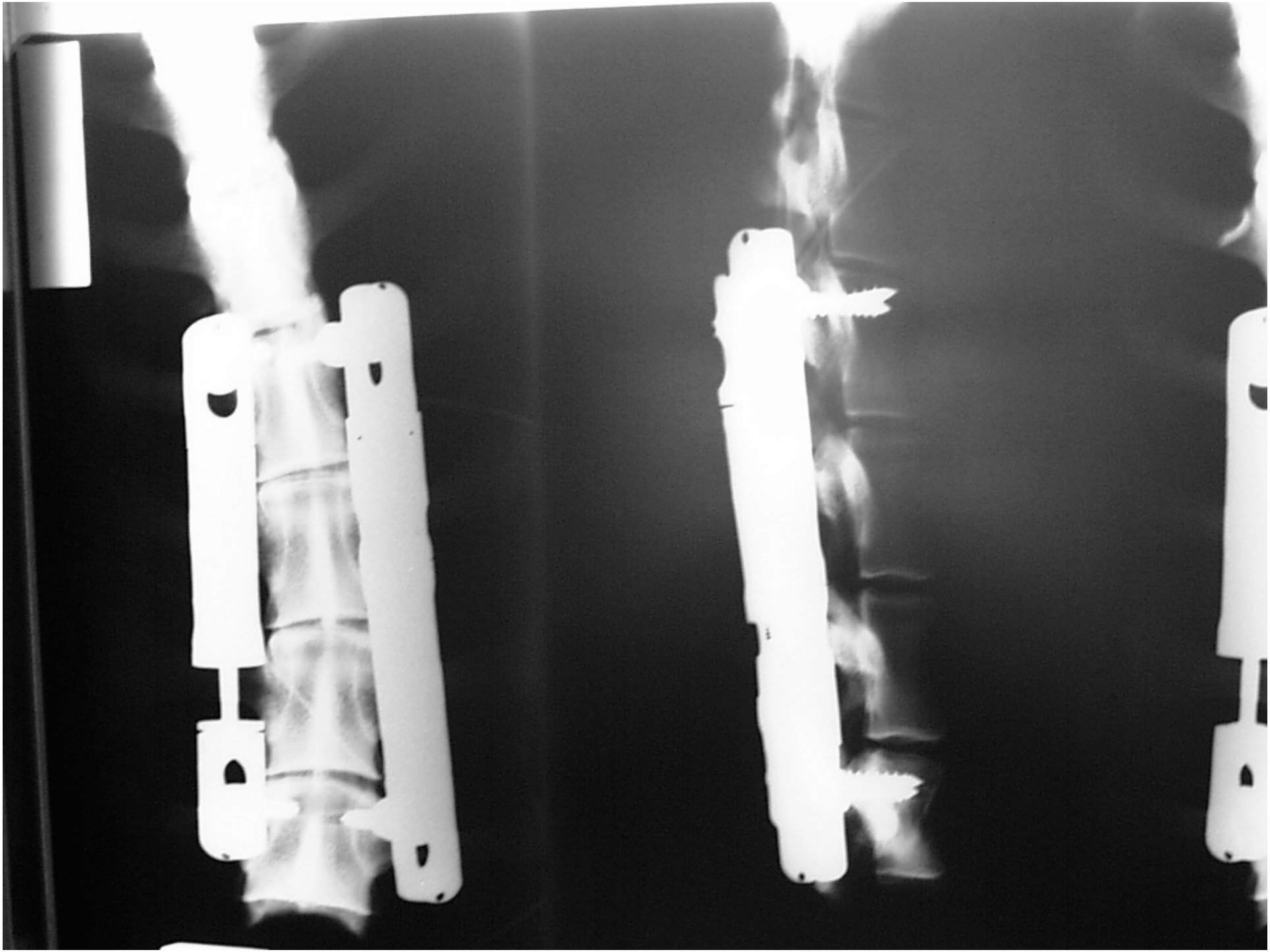




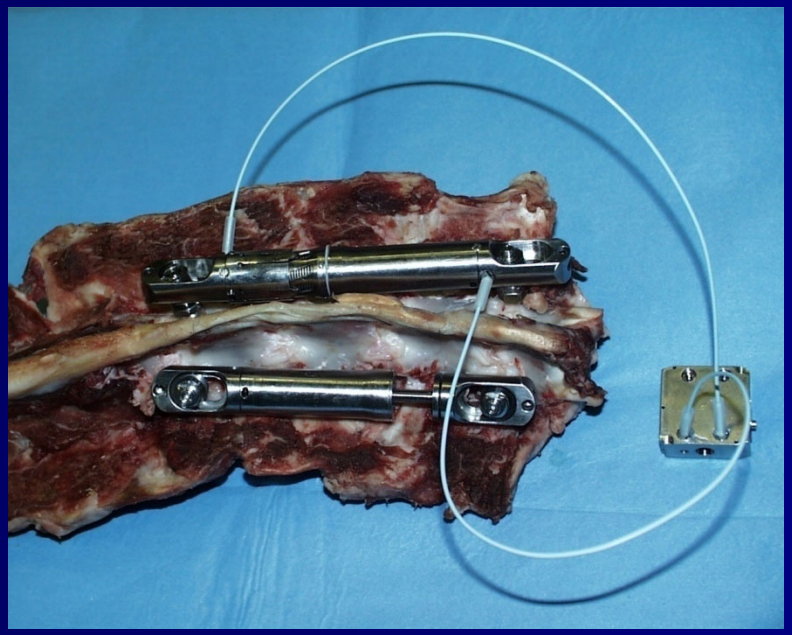

Q
A
C
B
D
E
W
Q = 0

Animal experimentation

- 3 implantations (Spanish team)
  - Demonstrating that the system generates a significant power source
    - Generating a scoliotic deformity in a ram
- Privately financed:
  - .....



To be followed....



- Will we be able to protect efficiently the bone anchor sites with a hydraulic damping system?
- How can we solve technical problems like miniaturization, prevention of leakage (microcircuits)?

Promising technique