

The Effect of Early Anterior Spinal Fusion on Spinal Canal Size in an Immature Porcine Model

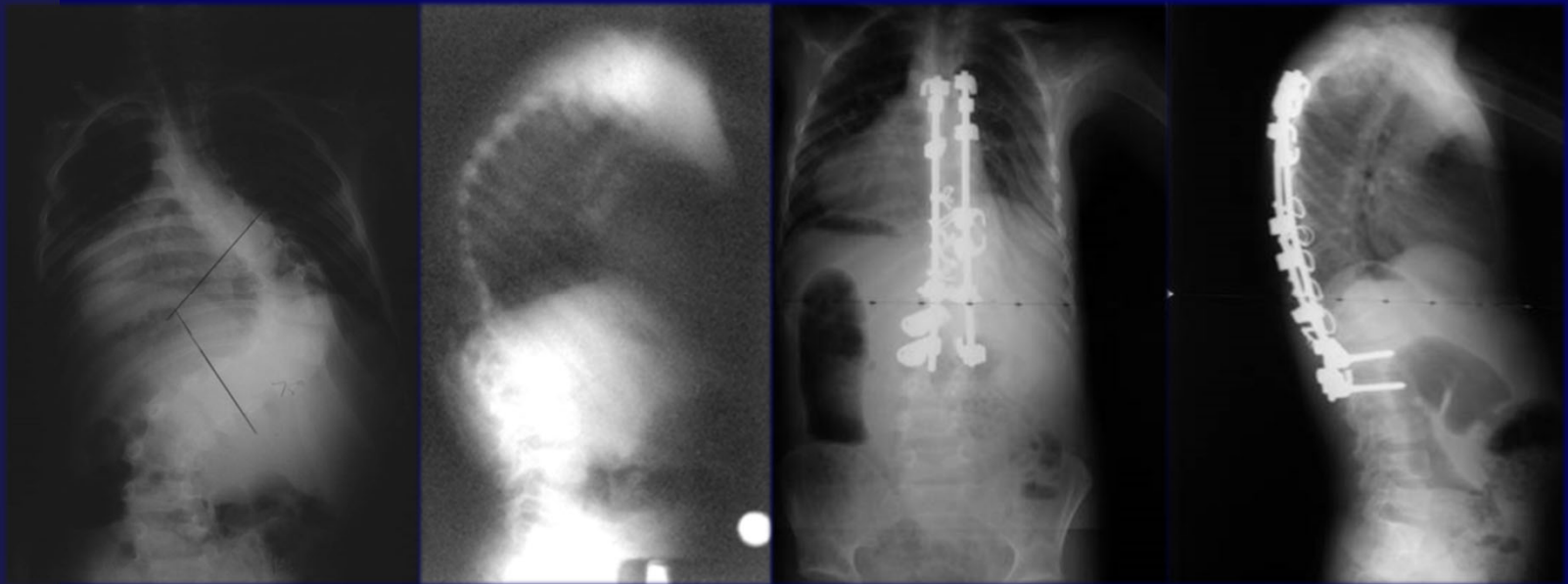
Guney Yilmaz, Murat Pekmezci, Kenan Daglioglu,
Ahmet Alanay, Emre Acaroglu, F. Cumhur Oner,
Mahir Gulsen, Muharrem Yazici





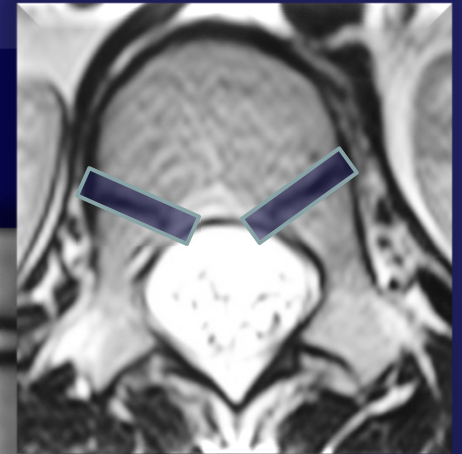
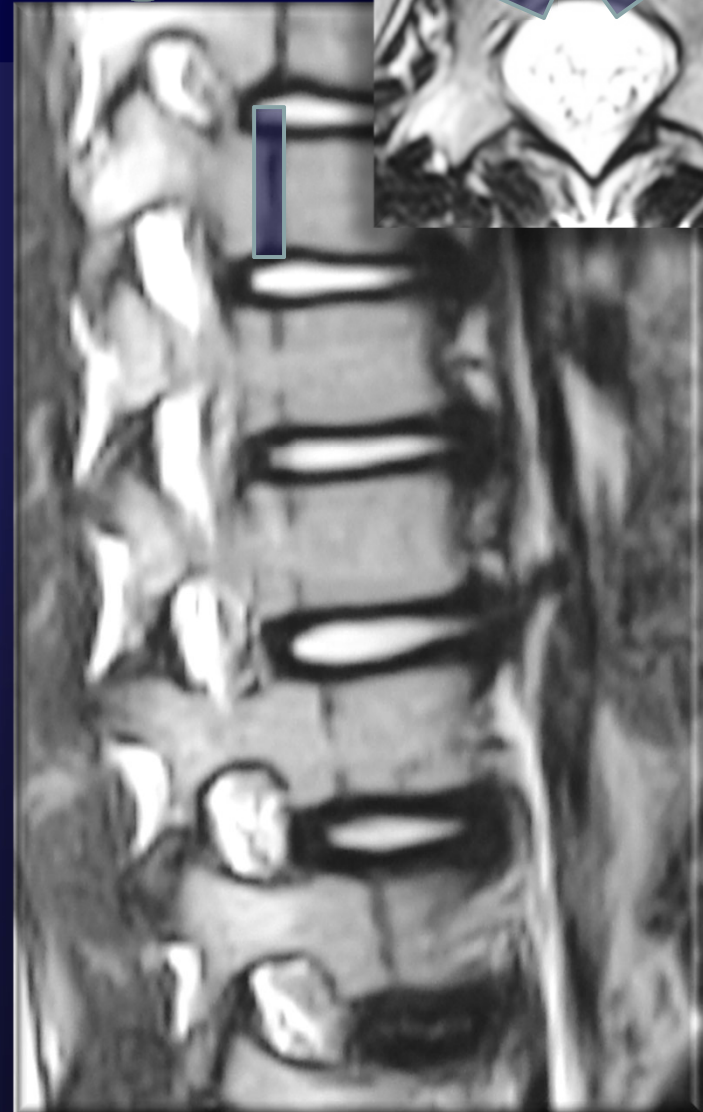
Anterior spine arthrodesis

- Increase of flexibility
- Prevention of crankshaft



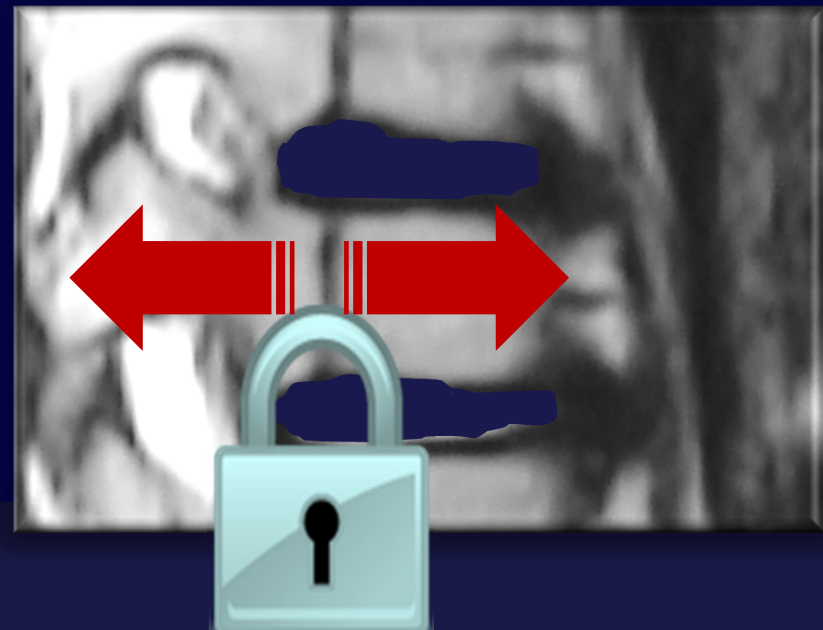
Neurocentral cartilage

- Posterior 2/3 of the vertebrae
- Growth of the pedicles and posterior vertebral body
- Posterior migration



Anterior spine arthrodesis

- Resection of intervertebral discs and ring apophysis
 - Longitudinal growth arrest
- Prevention of posterior migration of NCC?





Hypothesis

- The interbody fusion on each side of a NCC acts as a bony bar that limits the growth and migration of NCC, resulting in spinal stenosis





Aim

- To test if anterior spinal instrumentation and fusion may cause iatrogenic spinal stenosis in an immature porcine model



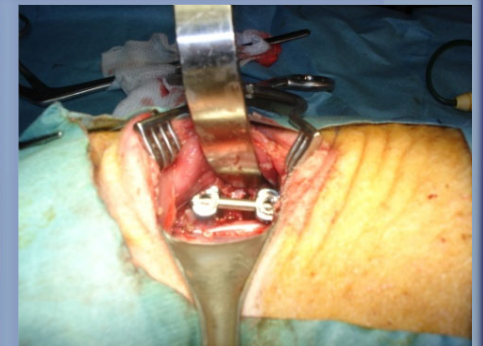
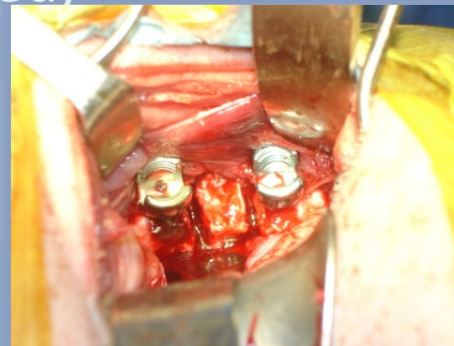
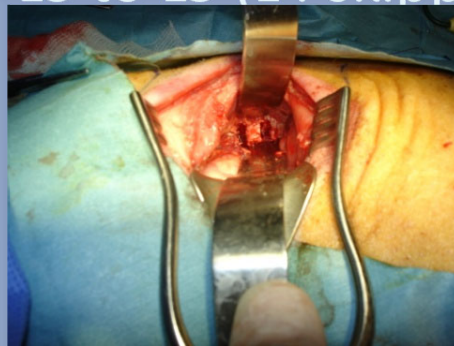
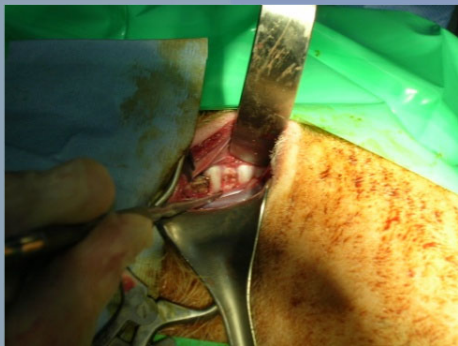
Materials & Methods

- Twelve 8 week-old domestic pigs
- X-ray
- Spinal canal measurement by CT
 - L1 to L6



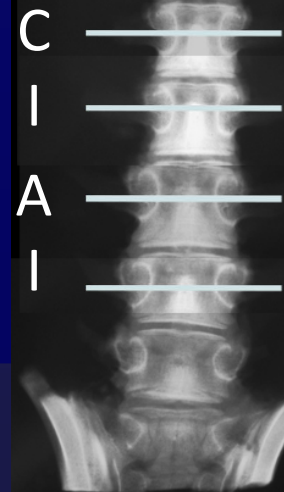
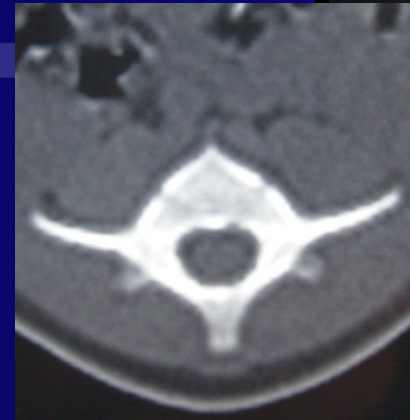
Materials & Methods

- Anterior instrumentation and fusion scenario
 - Circumferential discectomy
 - L3-L4 and L4-L5 discs
 - Anterior spinal instrumentation
 - L3 to L5 (L4 skipped)



Materials & Methods

- 6 months of age
 - CT examination
 - Canal area
 - Sections passing through pedicle level
 - Control level area
 - Adjacent levels to the proximal (L2)
 - Instrumented levels
 - L3 and L5
 - Arthrodesis level
 - » L4



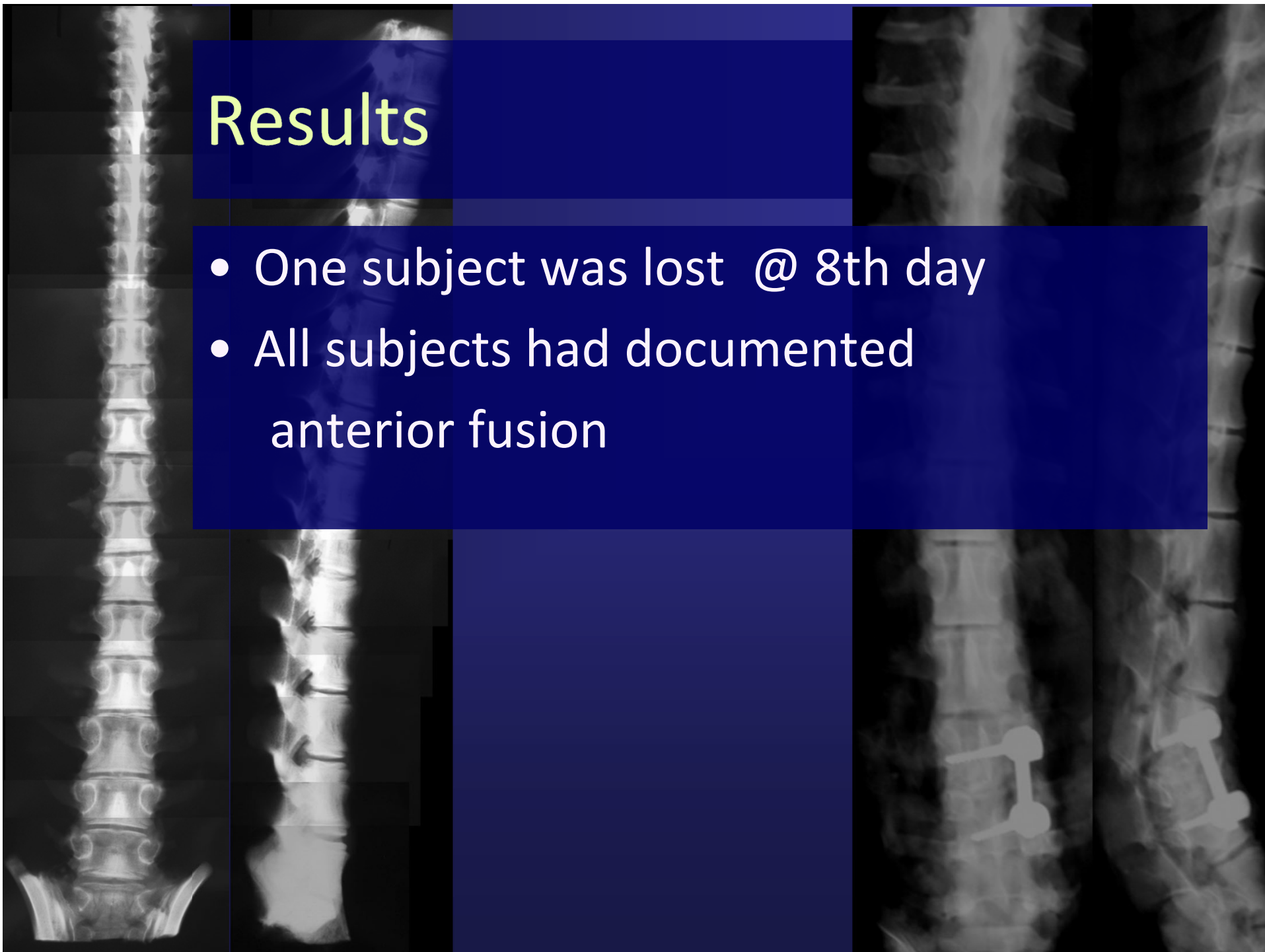


Materials & Methods

Change in canal area = $\frac{\text{Canal area @ maturity} - \text{Preop canal area}}{\text{Preop canal area}} \times 100$

Results

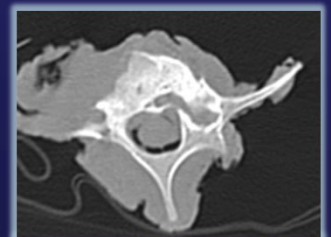
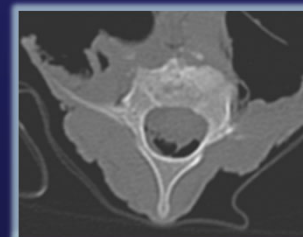
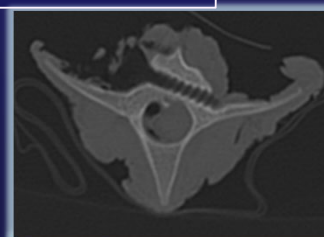
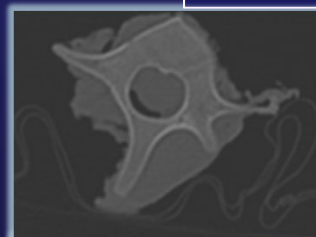
- One subject was lost @ 8th day
- All subjects had documented anterior fusion



Results

	L2	L3	L4	L5
Preop	0.56	0.62	0.70	0.77
FU	1.20	1.16	1.19	1.33
% increase	116.6%	85.8%	71.0%	71.2%

$p < 0.05$





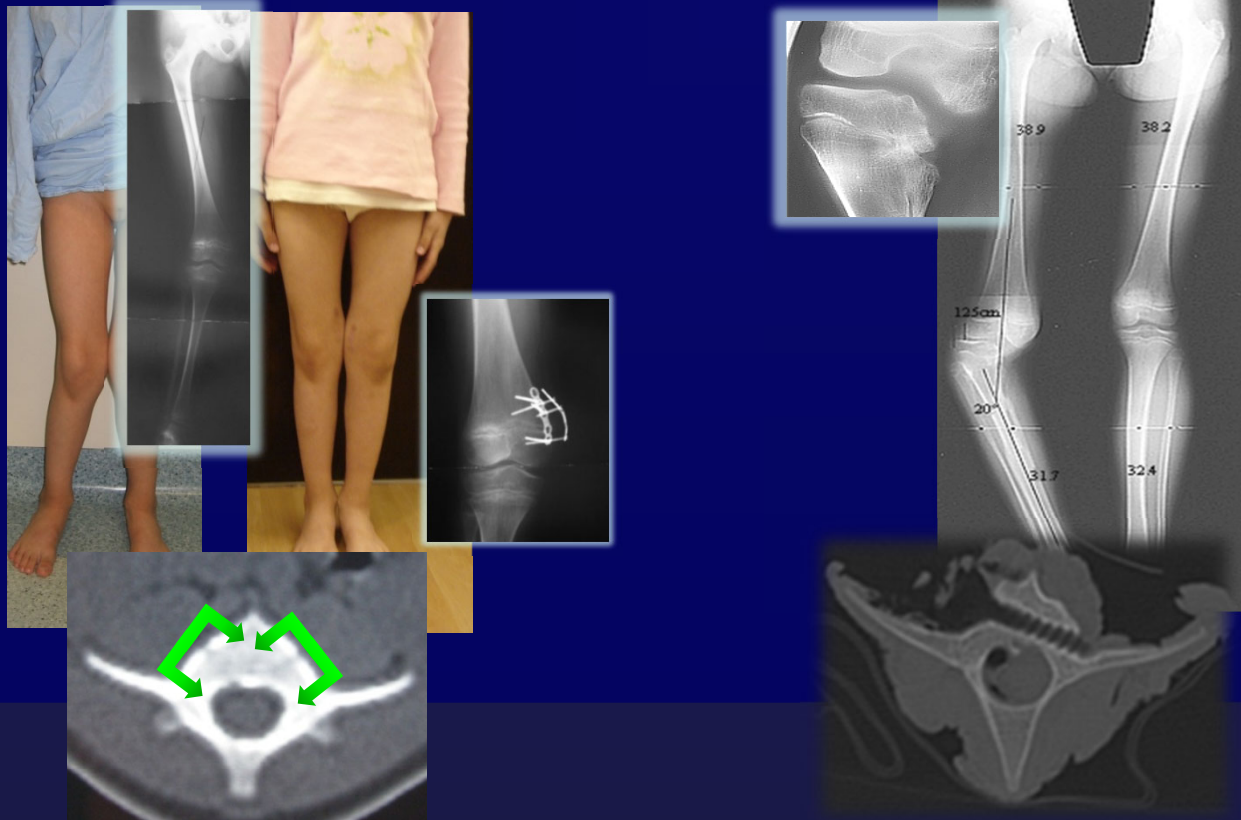
Conclusion

- Anterior spinal arthrodesis or instrumentation in the immature spine
 - May result in iatrogenic spinal stenosis



Tethering or destruction

- ◎ The growth of the neurocentral cartilage
 - > Tethering effect of the arthodesis or secondary to direct destruction by the anterior screws





Conclusion

- Spine surgeons operating on pediatric patients should be aware of this possibility