MODELLING OF SCOLIOSIS CORRECTION

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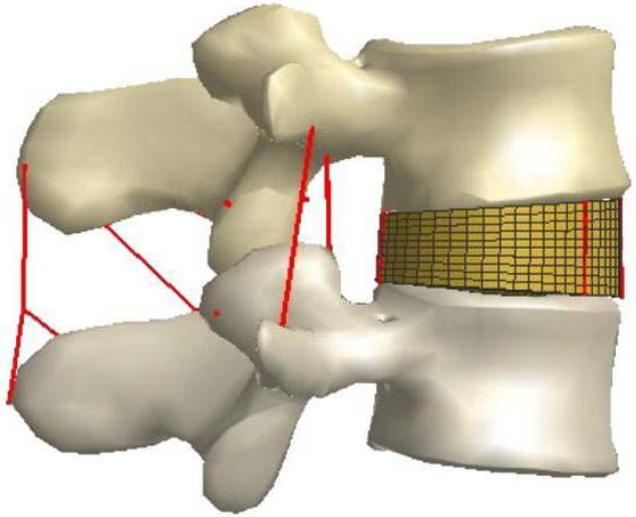
introduction

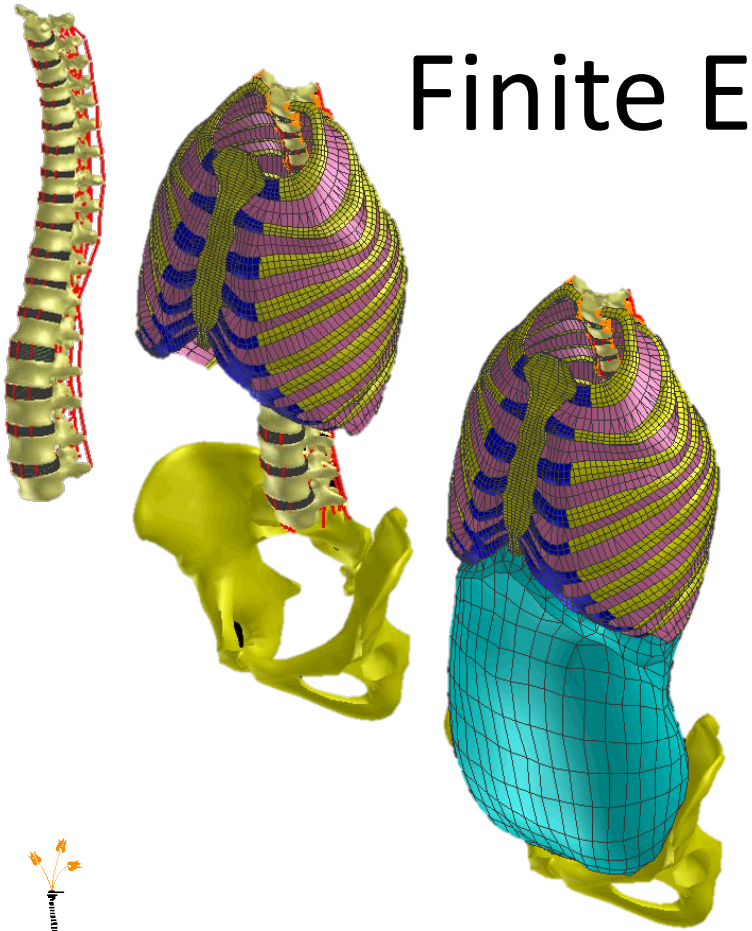
We developed a numerical model of the spine and trunk of an adolescent child.

This model can aid the development of new surgical techniques for scoliosis.

Finite Element model



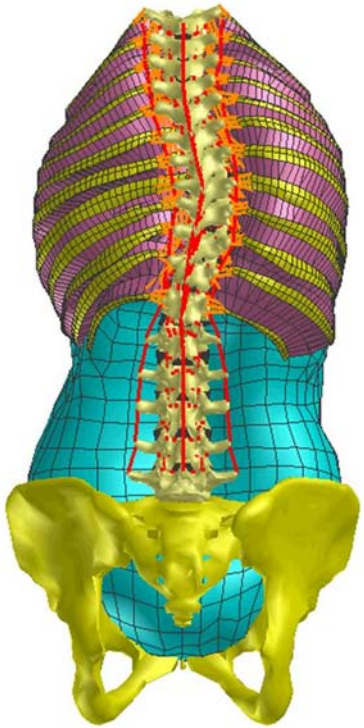
- vertebrae
- intervertebral discs
- ligaments
- facet joints



Finite Element model

- vertebrae
- intervertebral discs
- ligaments
- facet joints
- ribcage
- interabdominal pressure.

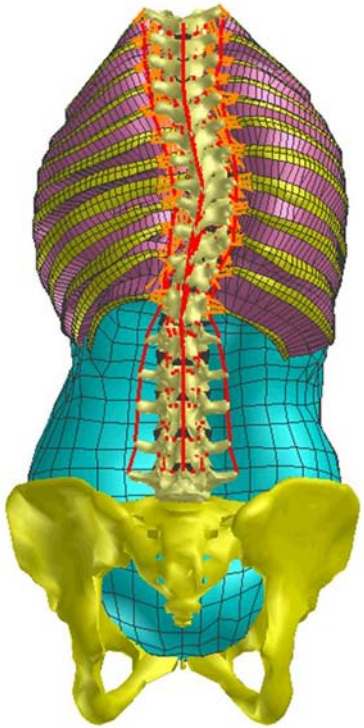
Finite Element model



Scoliotic model:

- Single thoracic curve
- Apex: T8
- Cobb angle: 32°
- Axial rotation of apex: 24°

Finite Element model



Correction modeled by multiple steps, each assuming complete adaptation of the soft tissues:

→ correctional load

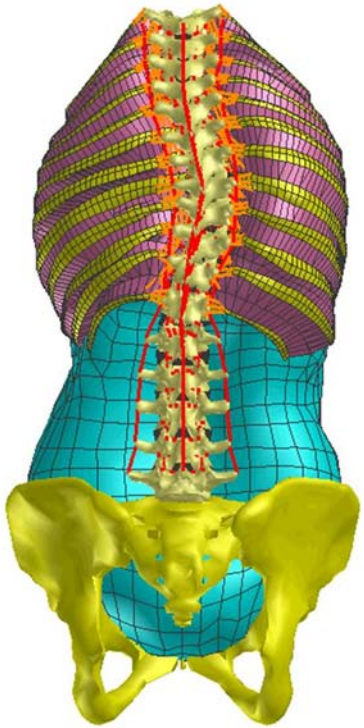
→ deformation

→ complete adaptation of soft tissue

→ correctional load

→ … etc …

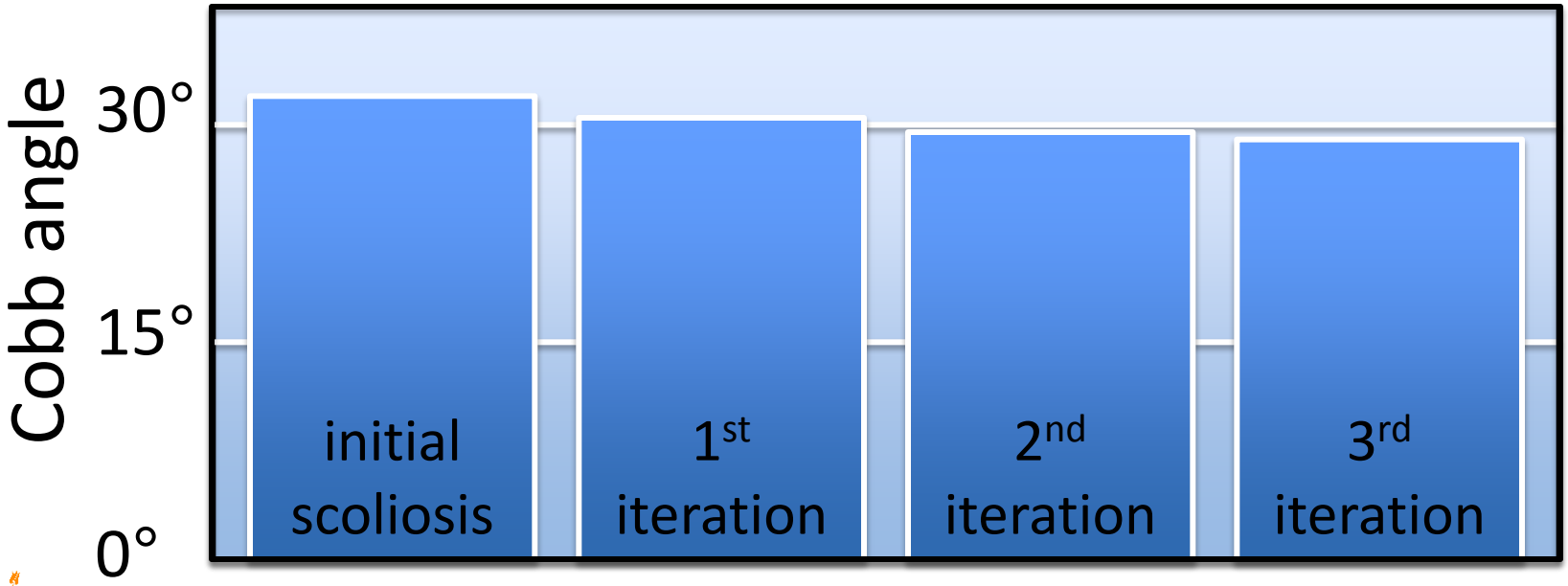
Finite Element model



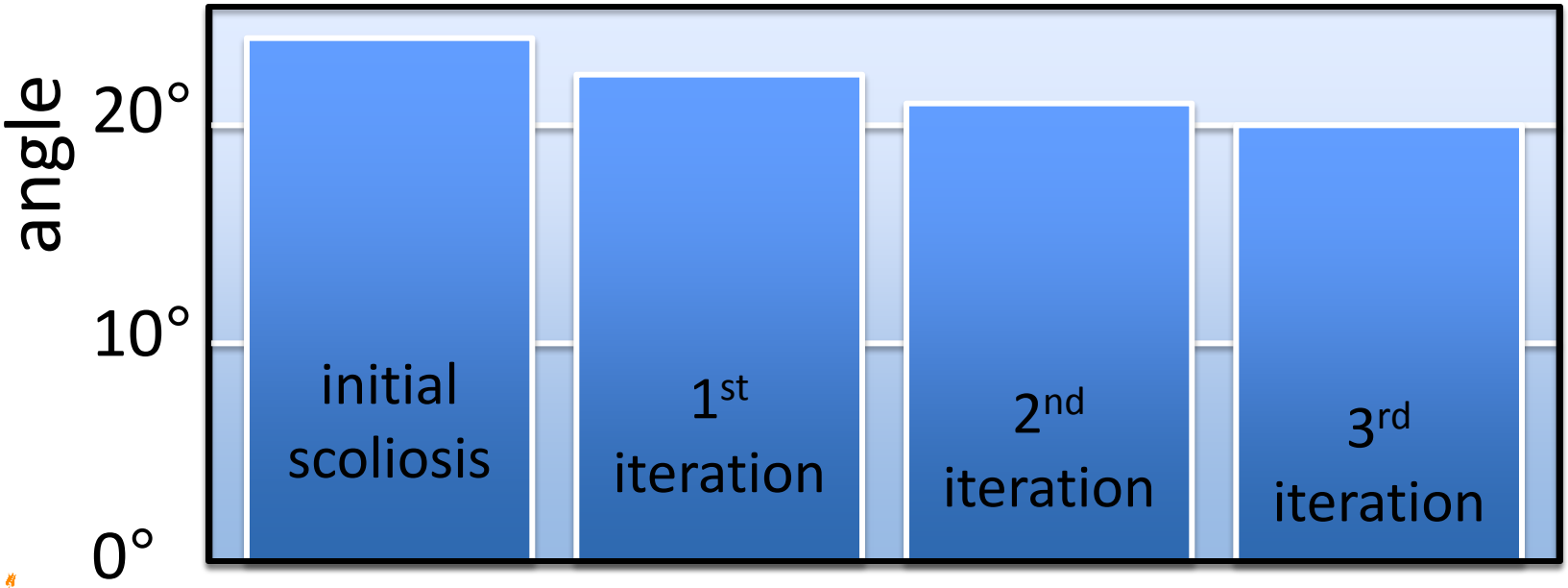
Modeled torsional implant:

- non-fusion implant
- correction achieved post-op
- attached to T4, T8, T11
- torsion load of 1.5 Nm at T8

results – Cobb angle



results – axial rotation



conclusion

modeling of both instantaneous and long-term scoliosis correction is possible by assuming total adaptation of the soft tissues

more adaptation steps are needed

future

by implementation of visco-elastic behavior and growth, a more realistic prediction of the long term behavior will be possible in the future

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Spineguide

a BMM project

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