#### Measurement of Forces Generated During Distraction of Growing Rods

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## Failure of growth rods

- Harrington, JBJS 1962, 11%
- Moe, CORR 1984, 50%
- Klemme, JPO 1997, 8%
- Mineiro, JPO 2002. 42%



# time distraction ?

### Aim of our study

To study the pattern of forces applied during distraction of single GR in subjects affected by EOS

#### Methods

- 10 Pts (4M/6F)
- Mean Age: 8 (6-11) yrs, pre-puberty
- 6 months after sub-fascial implantation of growing-rods (no previous anterior op.)
- Distraction measured via calipers with calibrated load transducer and mm scale







#### Methods

- 1mm by 1mm distraction
- 10 sec interval viscoelasticity
- Tension load for each mm of linear distraction (repeated for 2<sup>nd</sup> rod)
- Plot of Load-Displacement diagram to greatest distraction achievable

#### Results

- 10 x 2 measurements
- Mean static load: 125N (0 to 300N)
- Mean peak load: 485 + 55N (472 to 498N)
- Mean rod displacement: 11mm (6 to 12mm)
- Mean corr. 8 <u>+</u> 2 Cobb deg.
- Mean spinal length. 0.7 + 0.5 cm









#### **Force/Distraction Plot**

Distraction Force Measurement - Spinal Project Load Spectrum



#### Discussion

- Waugh, Acta Orthop Scand 1966: Failure of human cadaveric thoracic lamina @ 670N in children
- Dunn, Spine 1982: mean 720N peak load for Harrington instrumentation in AIS

#### Conclusion

No failure of bone-instrumentation interface with 11mm mean elongation & up to 500 N distraction force

## Thank you



